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DAIRY-HERD-TESTING ASSOCIATIONS.

REVIEW OF OPERATIONS FOR 1922–23 SEASON.

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THE herd-testing matter published from time to time in the *Journal* has indicated the rapidly increasing popularity of the association system in the Dominion, the records of over 84,000 cows having been ascertained by this method during last season. We are now able to give a summarized review of the 1922–23 season's figures available. The season itself was a most remarkable one for pasture-growth, and probably more favourable in general than the 1921–22 period. The fact that so large a number of herds were tested for the first time last season has somewhat decreased the association average yield as compared with the preceding year; but, all things considered, it must be accepted that the yield of the average cow under association test in New Zealand is very creditable.

For the 1922–23 season there were in operation 137 associations, fifty-seven of which, representing 34,558 cows, were controlled by officers of the Dairy Division. Of these fifty-seven associations average yields for fifty-six have been compiled, the remaining association having failed to continue sufficiently long to warrant including its figures in the present summaries.

The following tabulated statement gives the position so far as associations conducted by Dairy Division officers are concerned :—

Table 1.—Summary of Associations conducted by Dairy Division Officers (all Cows in Milk 100 Days and over included), 1921–22 and 1922–23.

	1921–22.	1922–23.
Number of associations	50	56
Number of herds	901	1,184
Number of cows	21,087	28,146
Average number of herds per association	18	21
Average number of cows per herd	23	24
Average number of cows per association	422	503

This shows an increase of six associations, 283 herds, and 7,059 cows. It may be mentioned, however, that although there is an increase of only six associations, eleven new ones are represented, five of the old ones having been taken off the Division's hands.

The next table, again covering associations with records figured by officers of the Division, shows the average production of all cows in milk for 100 days and over. It will be seen that the average cow yielded 232·99 lb. butterfat in 227 days.

Table 2.—Averages of all Cows in Milk 100 Days and over, for Associations conducted by Dairy Division Officers (56 Associations, 1,184 Herds, 28,146 Cows), 1922–23.

Association No.	Number of Cows.	Association Average.		Highest Herd-yield in Association.		Lowest Herd-yield in Association.	
		Days.	Butterfat.	Days.	Butterfat.	Days.	Butterfat.
			lb.		lb.		lb.
1	191	242	229·05	207	262·44	240	211·60
2	511	204	184·35	274	292·74	135	87·75
3	632	206	186·13	253	253·58	122	99·71
4	132	240	234·98	257	322·53	121	93·91
5	568	243	272·34	287	462·51	192	172·57
6	1,127	239	265·22	293	413·95	182	145·82
7	64	204	186·98	207	229·45	119	108·07
8	1,266	244	281·96	278	445·03	130	85·46
9	299	220	230·94	251	294·15	127	164·28
10	723	233	260·06	293	393·91	147	169·39
11	162	231	253·62	303	348·14	119	143·54
12	1,244	191	178·98	275	318·87	141	64·06
13	1,052	196	175·64	256	295·44	109	75·73
14	216	252	279·85	279	391·39	197	221·21
15	1,331	252	279·88	282	359·80	210	212·72
16	1,240	211	206·57	251	316·61	206	109·72
17	407	257	299·64	292	443·76	120	108·53
18	2,825	214	167·79	277	291·73	166	90·32
19	244	241	253·73	270	309·58	142	109·50
20	1,698	245	281·87	312	391·00	210	194·68
21	97	224	221·73	232	279·62	123	126·47
22	774	211	224·82	276	358·98	119	82·50
23	117	248	285·53	254	347·22	155	167·36
24	620	264	286·60	288	382·94	133	165·67
25	175	266	268·83	273	287·29	241	239·48
26	240	254	253·08	273	331·78	124	147·08
27	328	268	275·06	296	356·88	217	204·88

Table 2—continued.

Association No.	Number of Cows.	Association Average.		Highest Herd-yield in Association.		Lowest Herd-yield in Association.	
		Days.	Butterfat.	Days.	Butterfat.	Days.	Butterfat.
			lb.		lb.		lb.
28	213	240	235·74	269	344·33	210	161·07
29	386	267	304·75	298	355·98	139	121·81
30	186	236	240·81	256	322·27	106	122·96
31	459	232	252·38	269	299·46	216	198·11
32	659	249	267·61	263	330·23	111	122·06
33	53	185	219·77	239	282·41	155	184·77
34	719	203	214·55	255	381·74	100	114·25
35	122	220	224·46	280	318·59	136	116·60
36	355	243	235·60	212	345·61	168	120·79
37	146	256	270·73	291	391·39	207	211·73
38	657	238	222·56	292	312·17	123	129·59
39	335	226	244·33	242	335·58	167	151·63
40	266	214	232·37	252	364·50	137	90·87
41*	13	281	366·37	..	..	..	..
42	525	158	194·77	153	241·59	153	127·95
43	804	195	202·87	264	333·17	120	66·51
44	23	213	208·65	244	274·56	152	139·31
45	500	254	276·11	296	364·64	249	233·89
46	155	250	262·71	304	376·09	233	210·15
47	246	213	248·33	281	332·59	118	112·57
48	274	236	230·49	282	325·62	205	168·11
49	375	254	241·61	257	393·32	147	160·63
50	299	215	200·55	218	285·74	109	100·72
51	115	273	311·47	292	407·69	212	226·37
52	315	240	280·68	260	342·52	162	152·96
53	390	218	223·03	239	293·81	116	117·75
54	205	272	310·91	324	518·93	200	221·19
55	905	197	171·55	263	395·80	236	87·10
56	163	226	263·98	236	407·86	116	177·20

* One herd only in association average, and therefore not counted as highest association average.

	Days.	Pounds Butterfat.
Grand average of all cows	227	232·99
Highest association average	273	311·47
Lowest association average	214	167·79
Highest individual herd	324	518·93
Lowest individual herd	141	64·06
Highest individual cow	296	660·83
Lowest individual cow	105	26·22
Average daily production of butterfat per cow ..		1·0269

Comparing these figures with the preceding year's summary (*Journal*, August, 1922), it is shown that the average production of butterfat has decreased by 7·34 lb., and that there is a decrease of three days in the average number of days in milk. If, however, we add on three more days at 1·0269 lb. fat per day, or 3·08 lb. for the three days, the season's decrease is only 4·26 lb. butterfat, and the percentage decrease in average butterfat per cow per day only 1·77.

It has not been possible to collect complete data regarding the past season's average yield for privately conducted associations, but we have been able to gather figures for twenty-five associations, representing

22,537 cows. The figures are summarized in the following table, which, in keeping with figures quoted hereinbefore, is based on all cows in milk 100 days and over:—

Table 3.—Averages of all Cows in Milk 100 Days and over, for certain privately conducted Associations (25 Associations, 901 Herds, 22,537 Cows), 1922–23.*

Association No.	Number of Cows.	Association Average.		Highest Herd-yield in Association.		Lowest Herd-yield in Association.	
		Days.	Butterfat.	Days.	Butterfat.	Days.	Butterfat.
			lb.		lb.		lb.
1	405	248	292·52	280	424·11	239	251·14
2	313	223	233·75	265	298·14	193	181·14
3	2,500	245	266·61	272	381·22	194	137·13
4	1,400	165	171·04	278	404·06	186	155·87
5	371	182	165·53	118	205·94	120	87·49
6	275	258	269·56	256	348·06	236	196·83
7	180	213	225·26	229	255·90	204	192·58
8	494	173	174·07	231	309·67	110	69·20
9	160	211	245·66	290	490·30	180	190·20
10	1,200	231	225·00	277	446·71	209	93·88
11	1,530	234	268·60	292	488·04	236	191·59
12	1,893	222	232·36	266	390·44	205	135·12
13	316	212	217·19	225	261·71	197	178·88
14	1,989	170	159·49	145	204·87	199	125·42
15	1,100	253	242·11	279	373·42	283	197·42
16	145	225	243·71	267	317·70	182	127·87
17	1,957	259	277·80	312	373·75	203	121·22
18	208	184	176·00	244	247·00	160	105·00
19	281	240	247·85	264	362·35	189	193·71
20	432	246	256·56	278	332·62	200	151·35
21	240	207	225·25	253	282·70	106	118·00
22	563	242	291·40	266	371·37	187	220·47
23	2,220	236	242·53	275	336·52	161	149·89
24	787	246	274·54	321	488·54	239	225·35
25	1,578	216	223·14	232	418·63	256	172·22

* Number of herds in Association No. 23 estimated as 85.

	Days.	Pounds Butterfat.
Grand average of all cows	224	234·85
Highest association average	248	292·52
Lowest association average	170	159·49
Highest individual herd	290	490·30
Lowest individual herd	110	69·20
Highest individual cow	*	739·41
Lowest individual cow	120†	44·00
Average daily production of butterfat per cow ..		1·049

* Days in milk not given; second cow, 293 days, 668·81 lb. fat. † Second lowest cow, 213 days, 52·3 lb. fat.

It may be stated that, although all dairy companies interested in this work were circularized for information regarding cow-testing returns, we have been unable to procure figures for the remaining fifty-five groups, representing 26,901 cows. It has been ascertained that many associations fail to keep adequate records, merely figuring the returns and passing them on to the members, or else forwarding the sheets with the tests included, leaving the association member to

do his own figuring. As the majority of dairy-farmers have not the time or the facilities to do the work properly, this method is by no means satisfactory, and accounts in many instances for the gradual dwindling of interest and the final cessation of operations. Apart from this, it may be mentioned that much value can be obtained from periodic and annual summaries. We would therefore urge the secretaries of privately conducted associations to compile these, as they not only form a valuable record for subsequent comparison, but create interest among the members themselves. Any reasonable service which tends to encourage interest among the association members should be adopted, for without interest and enthusiasm the movement cannot prosper.

Combining Tables 2 and 3, it is found that the 50,683 cows comprised showed an average production of 233·82 lb. of butterfat in 226 days. For the preceding season we were able to compile figures from 21,087 cows, the average production being 240·33 lb. of butterfat in 230 days. There is shown, therefore, a small decrease in the production of the average cow in milk 100 days and over. Seeing, however, that the 1922–23 figures are for more than double the number of cows, representing many new herds, this decrease carries little significance. It will be apparent from these two tables that the inclusion this year of a summary of results from twenty-five privately controlled associations has not detrimentally affected the grand average, as the averages of Tables 2 and 3 are practically equal; in fact, the average for Table 3 is the higher of the two.

Now, while the average yield of cows in milk 100 days and over may indicate what the average cow under association test actually produced, it is not altogether a fair indication of what the average dairy cow is capable of producing, because cows culled in the early stages of their testing-period, and animals sold, or withdrawn through sickness or other causes, are included. We therefore consider that 210 days is nearer the average normal lactation period, and have accordingly included all records available for this duration in the following Table 4. This represents only associations controlled by the Dairy Division, as we were unable to procure from privately conducted associations summaries of this nature.

Table 4.—Averages of all Cows in Milk 210 Days and over, for Associations conducted by Dairy Division Officers (56 Associations, 970 Herds, 18,747 Cows), 1922–23.

Association No.	Number of Cows.	Association Average.		Highest Herd-yield in Association.		Lowest Herd-yield in Association.	
		Days.	Butterfat.	Days.	Butterfat.	Days.	Butterfat.
			lb.		lb.		lb.
1	154	259	243·60	228	295·21	264	240·05
2	246	248	225·23	274	292·74	221	166·09
3	309	243	216·54	253	253·58	216	150·72
4	109	260	254·21	257	322·53	258	212·87
5	437	263	298·50	287	462·51	221	205·00
6	832	263	288·07	298	430·28	215	175·45
7	32	259	204·78	244	273·29	264	181·94

Table 4—continued.

Association No.	Number of Cows.	Association Average.		Highest Herd-yield in Association.		Lowest Herd-yield in Association.	
		Days.	Butterfat.	Days.	Butterfat.	Days.	Butterfat.
			lb.		lb.		lb.
8	1,034	260	304·08	278	445·03	214	212·42
9	184	262	270·35	263	311·13	263	215·75
10	522	260	286·73	297	402·37	229	164·85
11	107	271	295·26	303	348·14	248	238·73
12	450	239	223·46	295	349·45	219	114·47
13	477	236	219·81	255	292·39	221	120·47
14	179	268	293·08	289	400·78	225	233·23
15	1,171	264	292·34	282	359·80	240	232·68
16	693	247	244·77	251	316·61	250	137·02
17	337	276	321·66	292	443·76	281	252·77
18	1,689	246	192·89	239	298·10	235	109·02
19	197	256	267·87	273	309·73	239	202·62
20	1,321	267	301·05	313	391·01	231	206·22
21	72	252	246·87	241	285·84	261	237·25
22	412	252	276·28	288	375·00	218	138·45
23	91	274	314·25	273	370·00	254	285·29
24	561	276	298·37	288	382·94	261	186·07
25	161	276	278·13	273	287·29	248	255·07
26	208	269	269·24	273	331·78	268	233·57
27	300	276	283·97	288	361·11	286	240·92
28	169	256	257·81	269	344·33	261	185·85
29	342	277	312·82	298	355·98	283	251·86
30	151	260	265·02	276	356·39	258	224·52
31	380	242	263·66	269	299·46	225	235·61
32	579	260	279·63	267	334·02	238	162·98
33	15	252	297·52	*	*	*	*
34	377	237	254·22	227	431·83	222	189·91
35	64	268	269·77	290	327·22	261	222·40
36	298	258	242·79	256	438·52	235	157·34
37	127	268	283·46	291	391·39	274	226·79
38	483	269	252·69	299	310·75	253	200·90
39	204	259	282·39	255	369·10	223	211·07
40	147	255	275·23	252	364·50	213	193·22
41	13	281	366·37	*	*	*	*
42	8	216	246·47	210	279·74	217	184·33
43	302	248	245·94	224	339·35	247	194·32
44	14	252	253·23	244	274·56	264	224·79
45	419	269	292·26	296	364·64	268	254·53
46	131	262	279·37	304	376·09	246	228·76
47	141	254	297·92	285	335·86	214	226·45
48	203	256	261·10	282	325·62	233	201·78
49	325	266	254·47	257	392·32	254	162·82
50	184	248	223·62	233	312·44	222	159·28
51	108	278	317·69	292	407·69	223	227·85
52	263	252	298·22	269	352·40	232	196·25
53	251	249	251·96	264	475·92	241	194·26
54	187	281	318·90	324	518·93	247	238·52
55	463	236	214·16	263	395·80	236	87·10
56	114	256	295·52	247	427·60	234	239·11

* One herd only in association average.

	Days.	Pounds Butterfat.
Grand average of all cows	258	267·10
Highest association average	276	321·66
Lowest association average	246	192·89

	Days.	Pounds Butterfat.
Highest individual herd	324	518·93
Lowest individual herd	236	87·10
Highest individual cow	296	660·83
Lowest individual cow	214	47·90
Average daily production of butterfat per cow ..		1·0355

For purposes of comparison it may be mentioned that for the season 1921–22 there were included in a similar summary 9,101 cows, averaging 271·48 lb. butterfat in 261 days. This year's figures from 18,747 cows show a decrease of 4·38 lb. butterfat and 3 days, but, considering the greatly increased number of cows, this may be regarded as almost negligible.

Comparing those associations which were in operation during both the two last seasons and for which summaries on the 210-day-and-over basis were prepared, it is found that twenty out of a total of thirty-two show an increase for last season over the preceding, while the remaining twelve show a decrease. The largest increase was one of 54·76 lb. butterfat on an average yield of 228·70 lb., which represents 24 per cent., the average days being practically the same. The largest decrease was one of 82·62 lb. on 326·22 lb., or 25·3 per cent. This was probably due to the number of days being less, and to the fact that many new herds had joined the association, while some of the old ones had fallen out. It must also be kept in mind that 326·22 lb. butterfat is a high average, and is therefore more susceptible to seasonal and other influences. This case is typical of the twelve associations which showed decreases, since all had been running for four or more years, with the exception of three, which had been in operation for three years, the decreases for the latter three being small. It has been noticed that after the third or fourth year of continuous operation association averages will often be found to go back somewhat. This may be accounted for by the fact that after three or four years of testing, with its resultant culling and selection, the average production of a herd reaches that stage where further increase is difficult, and where feed, care, and general conditions bear a more marked influence. About this stage also we find that the personnel of the older-established associations changes, many of the original members discontinuing—for a time at least. This also tends to decrease the average, which in due course will, as the result of culling and selection in the newer herds, rise again. It is this changing of members which makes it difficult by means of figures relating to association averages to truly show what improvement has been effected, the newer herds nullifying the increases in the older.

Comparing the same thirty-two associations referred to previously, it has been found that as between the two past seasons there is an increase of 1·8 per cent., the average production having risen from 271 lb. butterfat in 261 days to 275·87 lb. in 263 days, the number of cows being 8,140 and 7,899 respectively. To obtain the true course of an association's activities, however, it would be necessary to compare the same herds, rather than the same association, from season to season. Could this be done we feel confident the figures would show a larger increase.

It has been estimated that the average dairy cow in New Zealand yields approximately 168·42 lb. of butterfat per season, while the

records available, which are for 50,683 cows, show that the average cow under association test, and in milk 100 days and over, produced during the past season 233·82 lb. butterfat. We recognize that the majority of the herd-testing association members are the more progressive dairy-farmers, but we believe that if every dairy-farmer would test his cows, and study his records and act on them, it is reasonable to expect that the whole of our dairy cows could be brought to the average production of those tested. The difference in yield is roundly 66 lb. butterfat, and there are 1,248,643 dairy cows in the Dominion. Taking the value of butterfat at 1s. 6d. per pound, this represents, on an average production of 168·42 lb. butterfat, £15,772,234, whereas on 233·82 lb. it equals £21,896,828, a difference of no less than £6,124,594.

The opening-up of new land for dairying absorbs a large proportion of our poorer cows, but it may now be expected that each year, with more intensive dairying, there will be more scope for the selection of the better dairy cow, and when testing becomes more nearly general the cull-cow problem should largely settle itself. The association testing-system will therefore be a much more powerful instrument than formerly for the improvement of our dairy herds.

The present opportunity is taken to thank those dairy companies which were good enough to supply us with annual summaries of results for associations under their control. The Dairy Division is endeavouring to collect the fullest possible data regarding the production of our dairy cows, and any statistics which those conducting this work are able to supply will be always appreciated.

WALLACEVILLE VETERINARY LABORATORY.

THE annual report of the Department of Agriculture for 1922–23 summarizes the work of the Wallaceville Laboratory during that period as follows:—

In the course of the year 1,632 specimens were received for examination. These included milk-samples, pathological exhibits, blood for serological tests, water for bacteriological analysis, &c; 1,051 samples of milk from cases of suspected contagious mastitis were dealt with, and 231 samples of blood were examined by the agglutination method for the detection of contagious abortion. In addition, 106 composite samples of milk were received for test inoculations for the presence of tubercle bacilli; only one sample proved to be tubercular. Owing to the necessity for curtailing expenditure the prosecution of research work has been restricted. The curative treatment of contagious mammitis received attention; whenever available, subjects in the locality affected with this disease were secured for experimental treatment. Parasitic gastritis occurring among sheep and imported pedigree goats at the laboratory provided an opportunity to test the method advocated by the South African Veterinary Service of dosing with a mixture of arsenite of soda and sulphate of copper. This treatment in our hands proved most effective. A number of feeding experiments to test the toxicity of certain materials were carried out. Among these may be mentioned the effects of basic-slag absorption by sheep, the effects of feeding salt to swine, the feeding of clover raised upon soil from "bush-sick" areas; also tests with samples of calf-meal, honey, and mangold-liquor. The breeding of ferrets for disposal to settlers was continued, and a small herd of pedigree goats was maintained on the laboratory farm for disposal in the same manner. 78,200 doses of blackleg vaccine were supplied. Abortion vaccine in the shape of living cultures of the specific organism was supplied on request; 1,612 c.c. of tuberculin were sent out, and sixty-three doses of mallein were supplied.

SOME SOILS OF OTAGO PENINSULA.

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OTAGO Peninsula is one of those remarkable areas of volcanic origin in the South Island which occur as prominent features of the coast-line physiography, but which rarely occur far from the coast, and then only in unimportant masses. Banks Peninsula and Otago Peninsula, with their related contiguous areas, are the two great instances of this type of country that the South Island affords, which are highly important from an agricultural viewpoint, and therefore deserving of intensive study. As an instalment towards this consummation the following notes are offered.

Otago Peninsula was originally an island, isolated as a result of a submergence which drowned two valleys and the divide between their heads, forming a strait. The peninsula is now joined to the mainland by a sandy isthmus which originated as a bar across the southern entrance to the strait (Cotton, 1922). Over this isthmus runs the Anderson's Bay Road—the land means of access to the peninsula. In the early days of the Otago Settlement the country was forested, but now only isolated patches of "bush" remain, and the whole occupied area is practically devoted to dairy-farming. The peninsula presents some notable geological features. On the ocean or south-east side the sand has blown up from Sandfly Bay over a mountain more than 1,000 ft. high, so that as far as altitude is concerned Sandy-mount may be considered one of the most remarkable sandhills of the Dominion. Near here is also a blowhole and some basaltic pillars which are among the finest to be seen in New Zealand.

In February, 1920, the writer was able to pay a visit to this district and to collect a few samples from the waste and other virgin lands which appeared likely to afford interesting information. The dune-sands of the coast were collected from two widely separated localities, and proved rich in mineral plant-foods, similarly to some sands of the North Island described in the *Journal* for May, 1920, page 274. Littoral soils of a volcanic origin, subject to the action of sea-spray or of sea-inundation, were also collected, and show a very high potash content, while phosphate was present in good proportion. In a virgin forest soil at good elevation and derived from a volcanic rock all plant-food was found to be present in good degree. This soil was classified as a silt loam, and would be much heavier to work if it were not for the excellent effect of the high amount of organic matter present.

Only two samples were collected which did not represent virgin soils. One on Tomahawk Head, down in good pasture, appears to have been depleted in phosphate, other plant-foods being present in good proportion. The other was from a grassed paddock on the slopes of Harbour Cone. This soil was extremely rich in available phosphate and potash, and exhibited a well-nigh perfect mechanical composition

or texture. This Harbour Cone soil is not singular among peninsula soils in its high phosphate content. A soil from North-east Harbour which contained 0·04 per cent. of available phosphoric acid yielded in 1908 41½ tons of turnips per acre without any manure.*

Sandy soils derived from the dune-sands of the coast occupy a comparatively large area of the low-level soils of the peninsula, and if the results obtained can be taken as true for the whole of these soils it is time that some scheme of improvement were set on foot ultimately to enable them to be grassed.

Further investigation of the soils of the Dunedin area will be proceeded with as time and opportunity afford, with a view to the completion of a soil survey.

NOTES ON THE SAMPLES ANALYSED (SEE TABLES).

L 856 was taken at the top of the cliff, 200 ft. above the Tomahawk Beach, in a discontinuous salt-plant association, consisting of patches of *Chenopodium glaucum*, *Sonchus*, and *Senecio lautus*. This association occupies a strip some yards wide from the edge of the cliff, and the sample was taken in this area, the following sample (L 858) being taken in the adjoining area, which was grassed with rye-grass. The difference between the ease with which the salty area and the difficulty with which the grassed area was sampled was great. The sampler was only with much difficulty inserted into the latter soil. These fine sandy loams are remarkable for the high amount of available and total potash they contain. It will be seen that in the subsoils of these samples the lime-magnesia ratio is abnormal, there being more magnesia than lime extracted by the citric-acid method, while in the surface soils the proportion of each element is about the same. It is probable that such magnesia owes its origin to the sea-water blown inland as spray. The writer considers that the proportion of citric-acid-soluble magnesia present in arable soils should not exceed that of the lime. It will be noted that the available phosphate is present in larger amounts in the soil (L 856) near the cliff than in the soil (L 858) farther away. These soils are derived from a volcanic rock, trachyte, which underlies them, according to Dr. Marshall (1906). Trachyte contains a large amount of silica, potash, and soda, whereas basalt contains much less silica and more lime, iron, and magnesia.

L 860/1 and L 864/5 are coarse sandy soils, the dune-sands of the coast wind-carried to their present situation some distance from the seashore. The first soil and its subsoil (860/1) differ from the next (864/5) in that there are a comparatively recent dune-sand near sea-level, whereas the latter is from more ancient dune near the top of Sandymount, about 1,000 ft. elevation. The recent dune is very high in available phosphate, and is also high in potash. The ancient dune, while still fairly high in phosphate, has a subsoil which is decidedly deficient in total phosphate. The richness of the wind-blown sands of this district in mineral plant-food shows that the soils only require

* See K 2709, fine sandy loam, in the annual report of the Dominion Laboratory, 1909 (page 54). K 2708, loam, and L 50 and 51, fine sandy loams (referred to in the same report), are also from the same locality, but do not exhibit the same excellence in chemical composition.

SOILS OF OTAGO PENINSULA.—CHEMICAL ANALYSES. (Results, except *, are percentages on soil dried at 100° C.)

Laboratory No.	Locality.	Volatile Matter.		Total Nitrogen.	1-per-cent Citric Acid Extract, Dyer's Method; Hall's Modification ("Available" Plant-food).				Hydrochloric-acid Extract ("Total" Plant-food).			
		*At 100° C.	On Ignition.		Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Phosphoric Acid, P_2O_5.	Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Phosphoric Acid, P_2O_5.
L 856	Tomahawk Head	4·44	10·13	0·238	0·110	0·104	0·064	0·022	0·94	1·11	0·55	0·18
L 857	Subsoil of 856	4·68	7·30	0·150	0·083	0·109	0·045	0·008	0·88	1·08	0·57	0·12
L 858	Tomahawk Head	2·98	8·04	0·202	0·082	0·079	0·043	0·008	0·89	0·64	0·60	0·07
L 859	Subsoil of 858	2·70	5·51	0·095	0·052	0·066	0·038	0·005	0·86	0·70	0·59	0·03
L 860	Tomahawk Beach	0·18	1·06	0·025	0·115	0·022	0·033	0·061	0·81	0·24	0·13	0·14
L 861	Subsoil of 860	0·12	0·64	0·014	0·092	0·020	0·037	0·058	0·70	0·21	0·12	0·09
L 862	In virgin forest	7·70	25·01	0·516	0·157	0·102	0·039	0·024	0·50	0·65	0·29	0·11
L 863	Subsoil of 862	6·90	12·69	0·210	0·056	0·057	0·036	0·011	0·29	0·72	0·25	0·10
L 864	Sandymount	0·48	1·91	0·050	0·062	0·025	0·026	0·022	0·44	0·21	0·09	0·08
L 865	Subsoil of 864	0·48	1·55	0·039	0·068	0·033	0·021	0·026	0·46	0·22	0·08	0·03
L 866	Harbour Cone	3·92	12·59	0·338	0·174	0·077	0·070	0·063	0·84	0·50	0·68	0·15
L 867	Subsoil of 866	2·86	9·63	0·167	0·080	0·051	0·055	0·019	0·72	0·52	0·70	0·06
L 868	Harbour Cone (foot) ..	6·48	18·03	0·614	0·151	0·200	0·173	0·020	0·74	0·61	0·57	0·18
L 869	Subsoil of 868	3·20	8·14	0·209	0·118	0·140	0·193	0·021	0·92	0·62	0·45	0·11

MECHANICAL ANALYSES. (Results are percentages on air-dried soil.)

Lab. No.	Description of Soil. (Classification of United States Department of Agriculture modified.)	Analysis of "Fine Earth" passing 2 mm. Sieve.							Stones and Gravel
		Fine Gravel.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture and Loss on Ignition.	
L 856	Fine sandy loam ..	0·2	8·6	21·1	28·7	13·6	14·9	13·8	Nil.
L 857	,, ..	Nil	9·4	21·4	28·4	10·1	20·7	11·6	,,
L 858	,, ..	,,	9·8	22·4	31·4	10·3	17·4	10·8	,,
L 859	,, ..	,,	5·6	24·9	29·1	10·1	23·3	8·1	,,
L 860	Coarse sand	,,	82·8	14·5	0·5	0·4	Nil	1·3	,,
L 861	,, ..	,,	80·9	16·9	0·4	0·3	,,	0·8	Trace.
L 862	Silt loam	,,	2·7	9·4	23·3	13·7	21·7	30·7	,,
L 863	,, ...	,,	3·9	11·9	24·3	15·8	28·1	18·7	Nil.
L 864	Coarse sand	,,	84·3	11·4	1·1	0·3	Nil	2·4	Trace.
L 865	,, ...	,,	85·5	10·5	1·1	0·5	,,	2·0	Nil.
L 866	Fine sandy loam ..	,,	1·5	18·3	37·6	11·3	16·7	16·0	Trace.
L 867	,, ..	,,	0·5	24·3	31·6	12·4	18·2	12·1	Nil.
L 868	Silt loam	,,	2·6	9·3	38·1	13·3	11·2	23·3	Trace.
L 869	Fine sandy loam ..	,,	5·5	31·6	33·2	8·2	10·4	11·1	Nil.

fixing and reclaiming in such a way with a plant covering that, when sufficient organic matter has been introduced, suitable grasses may be planted, and thus finally a permanent sward be established. An active foresting policy might prove the first stage to the economic reclamation of the most intractable of the sands. All the elements except nitrogen are present in good proportions for the growth of ordinary farm-crops suitable for light sandy country. Nitrogenized organic matter could be accumulated in the soil by foresting the area or by growing suitable plants, such as lupins, &c. One would think that pine plantations would be a great asset to this thickly settled district for the timber produced as well as for the beneficial effect on the soil.

L 862/3, 866/7, and 868/9 represent the type of soil which is the mainstay of the farmer in all countries—the loams.

L 862/3 were collected on the upper road of the peninsula, at an altitude of 500 ft., in the remains of forest consisting of rimu, totara, mahoe, fuchsia, broadleaf, bramble (*Rubus australis*), elderberry, coprosma (several species), *Panax Colensoi, Drimys,* and *Muehlenbeckia australis.*

L 866/7 were collected on the slopes of Harbour Cone in rye-grass, clover, and timothy pasture. This soil has an abnormally high phosphate content. Silt is the largest fraction, therefore the soil should possess a sufficient but not too great power of retaining water. The fine silt is lower than the clay, which is present in satisfactory amount. As there is a considerable amount of fine sand, the absence of coarse sand is no disadvantage. One would predict high fertility for this soil from a consideration of its physical and chemical characters and climate, and a profitable return to its owner owing to the proximity of the locality to the market.

L 868/9 were taken in a salt-marsh plant association at the foot of Harbour Cone, on the shores of Hooper's Inlet. The soil is a silt loam resting on a fine sandy loam, and is subject to inundation by the brackish water of the inlet. The abnormally high potash content and the unbalanced lime-magnesia ratio are characteristic of salty soils, as is also the good amount of phosphate present. The proportion of silt is rather too high, but this might be remedied by bringing up some of the sandier subsoil when these silty soils come to be reclaimed.

Nosema apis, the protozoon occupying the epithelial cells of the chyle stomach of bees, has been traced to many parts of the Dominion, and it would appear to be almost universal. Its presence in bees, however, cannot be associated with any acute disorder in New Zealand, though minor troubles have been occasionally found present in bees harbouring the organism.

Phosphates in New Zealand.—A new locality for the occurrence of phosphate rock in New Zealand apparently exists in the North Auckland district. Mr. H. Parsons, of Rawene, Hokianga, forwarded to the Department's Chemical Laboratory last year a specimen of rock which contained 11·12 per cent. phosphoric acid, equal to 24·4 per cent. tricalcic phosphate. A specimen of greensand, received from Mr. L. W. Kempthorne, of St. Andrew's, near Timaru, was found to contain 4·1 per cent. phosphoric acid, equal to 8·95 per cent. tricalcic phosphate.

FARMERS' FIELD COMPETITIONS, 1922-23 SEASON.

TARANAKI, WANGANUI, AND FEILDING DISTRICTS.

J. W. DEEM, Fields Instructor.

THESE competitions have been continued as in previous years, fourteen localities taking part in 1922 23. The wet season was rather detrimental to good cultivation and heavy yields, conditions being so bad in some parts that no entries were made. After eliminating all failures, the following crops were judged: Mangolds, 119; carrots, 64; swedes, 63; soft turnips, 20; lucerne, 71; and maize, 5: a total of 342. These figures mark a net increase of eleven over those of the previous year. Soft turnips fell off in entries, while lucerne showed a considerable increase.

All these crops were judged by Instructors Glasson, Schwass, and the writer. Small competitions were held in a few other centres, and the crops judged by local judges. In most districts, as in previous years, farmers turned out in large numbers for the judgings, and took a keen interest in the proceedings. In some of the more active centres the number of young farmers who attend is very gratifying, and it is this type of enthusiast that is going to derive the greatest benefit from the competitions.

In localities where the competitions have been going longest the averages of the crops continue to increase, and the better cultivation and general care are very pleasing. Taking, for example, places like Otakeho and Maxwelltown, the former, with nine crops of mangolds, had an average of 68 tons 8 cwt. per acre, and the latter, with seventeen crops, the even better average of 69 tons 18 cwt. To a lover of a good and well-cared-for crop a day spent at the judging in either of these localities was very enjoyable.

MANGOLDS.

Mr. Charles Willis, of Matapu, won the championship for south Taranaki with a crop of 84 tons 6 cwt. per acre—total points, 182½. Last year's winner, Mr. J. Dakers, of Manaia, was second with 182 points—a very close contest. In the Wanganui district Mr. H. Birch, of Maxwelltown, won again this year with a crop of 93 tons 5 cwt. per acre, beating his previous year's record by 5¼ tons. This was an exceptionally fine crop, as shown in the accompanying photograph, and reflected great credit on the grower. In the Feilding district the best crop, 77 tons 1 cwt. per acre, was grown by Mr. W. E. Johnston, of Te Arakura. These competitors also won the Sutton Cups for the best crop of mangolds in their respective districts.

It is very pleasing to record the interest Messrs. Sutton and Sons, through their New Zealand agents, Messrs. J. G. Ward and Co., continue to take in these competitions. In addition to the three handsome cups presented last year, they have promised a fourth for the Rongotea district. These trophies have assisted greatly in stimulating interest in the movement.

MR. H. BIRCH'S MANGOLD CROP, MAXWELLTOWN.

Area, 1 acre; yield, 93 tons 5 cwt. per acre. Winner of the Sutton Cup for Wanganui district.

Prizewinner Yellow Globe, White Sugar, and Jersey Queen are the varieties that show up best in the competitions. From an analysis of the fourteen competitions it is found that Prizewinner constituted 58 per cent. of the crops judged, and won ten competitions and all the championships; White Sugar constituted 9 per cent. and won two competitions, and Jersey Queen 6 per cent. and two competitions; while Long Red constituted 8 per cent., but again failed to win a competition. The remaining 19 per cent. was made up of mixed varieties and a few sorts not grown extensively.

Over the whole of the competitions Prizewinner averaged 54 tons 17 cwt. per acre, White Sugar 57 tons 18 cwt., Jersey Queen 54 tons 1 cwt., and Long Red 43 tons 9 cwt. In the Feilding district Prizewinner was grown almost exclusively, and there was only one crop of White Sugar in that locality. If we exclude the Feilding figures the average weight per acre of Prizewinner is 58 tons 13 cwt.

The mangolds were grown in various-width drills, ranging from 14 in. to 30 in. Summarizing the results, 9 per cent. of the crops were grown in 14 in. drills and secured two competitions, 15 per cent. in 21 in. drills and won one competition, 14 per cent. in 24 in. drills, 8 per cent. in 26 in. drills, and 42 per cent. in 28 in. drills. All the last-mentioned three won three competitions. One crop in 18 in. drills and one in 27 in. drills each won a competition.

These figures confirm the findings of previous years—namely, that on the average the best mangold crops are grown in fairly wide drills, where the cultivation can be done thoroughly by means of the horse-hoe.

The following table gives the average weights per acre of mangold crops in the Taranaki, Wanganui, and Feilding districts for the past three seasons:—

	1920–21.		1921–22.		1922–23.	
	Tons	cwt.	Tons	cwt.	Tons	cwt.
Taranaki	51	9	56	18	54	19
Wanganui	44	1	56	18	65	19
Feilding	33	19	46	10	42	15

The averages over the three districts combined were—1920–21, 45 tons 8 cwt.; 1921–22, 55 tons 1 cwt.; 1922–23, 53 tons 12 cwt.

As in previous years, various manures have been used, and it is difficult to fix on any particular one as best. The heaviest crop in Taranaki, 84 tons 5 cwt. per acre, was grown with 4 cwt. of special mangold-manure; in Wanganui district, 93 tons 5 cwt., with half superphosphate and half bone-meal at 4 cwt. (plus salt at 5 cwt.) per acre; and the best crop in the Feilding district with basic super at 4 cwt. per acre. The main points appear to be a liberal dressing of phosphatic manure (a fair portion of which is readily available), some salt or kainit, and plenty of good cultivation.

CARROTS.

The areas of carrots in the competitions were larger than in previous years, indicating that this root is increasing in favour each year for feeding cattle and sheep.

Matchless White is by far the favourite variety grown, with Sinclair Champion next. Of the total number of crops judged,

53 per cent. were Matchless White and won seven competitions, 22 per cent. Sinclair Champion and won one competition, 5 per cent. White Belgian and won two competitions. The remaining 20 per cent. consisted mainly of mixed varieties and secured only one competition.

Over all the competitions Matchless White gave an average yield per acre of 42 tons 15 cwt., Sinclair Champion an average of 38 tons 4 cwt., and White Belgian an average of 44 tons 8 cwt. A few Long Reds were grown, but they are too deep-rooted. The heaviest crop of carrots was 62 tons 3 cwt., against 64 tons 9 cwt. per acre last year. The average for all the crops in the competitions this year was 41 tons 4 cwt., against 40 tons 1 cwt. last year.

The method of sowing varies. Summarizing the results, it is found that 34 per cent. of the crops were grown in 14 in. drills, and averaged 43 tons 10 cwt. per acre, and won five competitions; 22 per cent. in 21 in. drills averaged 45 tons 14 cwt., and won four competitions; 30 per cent. in 28 in. drills averaged 34 tons 3 cwt., and won one competition. The remaining 14 per cent. were in various-width drills. A crop in 26 in. drills won one competition.

Manures used were very varied, and most mixtures applied at 3 cwt. to 4 cwt. per acre appear to have given good results. In seeding, from 1 lb. to 1½ lb. per acre gave the best returns.

SWEDES.

These, as usual, were mostly sown on the flat, either through every coulter or every second coulter of the drill, only a few farmers so far using the ridger. They did not show so much disease as last year. The main varieties grown were Superlative, Magnum Bonum, Masterpiece, Grandmaster, and a few crops of Vilmorin's White Purple-top. The Superlative, as usual, grew heavy crops but suffered most from dry-rot, Magnum Bonum and Masterpiece being also badly affected. Grandmaster, although showing a fair amount of dry-rot in some places, furnished a number of very fine, sound crops. Vilmorin's White Purple-top gave heavy weighings, and was only very slightly affected with dry-rot. Unfortunately, this swede forked badly and grew very deeply in the ground, which is objectionable both for pulling and feeding-out, but even with these faults it would be largely grown if seed were available. Most of the winning crops had from 2 cwt. to 3 cwt. of manure per acre—all sorts of fertilizers being used. While no particular mixture stands out, the best results were obtained from mixtures containing about half superphosphate in conjunction with a slower-acting phosphate like bone-meal, Ephos, Nauru, or basic slag. Basic super also gave good results. The addition of nitrogen in any form does not appear beneficial. The crops averaged for Taranaki 35 tons 9 cwt., and for Feilding 29 tons 11 cwt., or an average over all of 34 tons 7 cwt., against 30 tons 4 cwt. last year.

LUCERNE.

The lucerne competitions are divided into three classes—namely, crops under twelve months old, crops over twelve months and under two years, and crops over two years old. By this arrangement

interested farmers who go round at judging-time are enabled to follow the respective crops from year to year and mark their progress and treatment. Lucerne-judging days are very popular. In going round year after year it is noticeable that most of the competitors are extending their areas. Drilling from 15 lb. to 18 lb. of Marlborough seed, with from 2 cwt. to 3 cwt. of a phosphatic manure—super or basic slag for preference—continues to give the best results, the land having been previously limed at from 8 cwt. to 20 cwt. per acre.

GENERAL.

At the Hawera Winter Show exhibits from the first, second, and third crops of most of the competitions were staged. These exhibits carried cards setting out full particulars of the variety, date sown, manure used, and general cultural methods. It made a very fine and instructive display.

THE RELATION OF BIRDS TO AGRICULTURE IN NEW ZEALAND.

V. THE KINGFISHER, THE CUCKOOS, AND THE PARROTS.

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THROUGHOUT this series of articles it has been the aim of the writers to state facts and nothing but facts. The agriculturist is often forced to realize the damage inflicted on his interests by birds, and it is only natural that this should be uppermost in his mind when he thinks of birds. It is the more natural since the good services of birds are among the silent processes of nature, which do not become obvious until naturalistic studies are bent upon them. The enthusiastic bird-lover, on the other hand, is not often concerned directly with agricultural interests; he may be carried away entirely by his strong perception of the good birds do, and, as a result, the cause of the birds themselves is his first object. Shelford goes so far as to state that "When one comes to love an animal or a group of animals he is in no position to draw scientific conclusions regarding it"; but to the present writers this seems an extreme view. The aim of these articles is to present the exact scientific standpoint, and to preserve a just balance between the prejudices of the farmer and the enthusiastic eulogium of the bird-lover. That they have been at least partially successful in this endeavour is indicated by accusations now levelled against them with considerable frequency of, on the one hand, making out too good a case for the birds, and, on the other, of making it not good enough. In no case is this balance more necessary than in that of the kingfisher—the next bird on the list.

THE KINGFISHER (SAUROPATIS SANCTUS VIG. AND HORS.).

There is probably no need to describe to New Zealand readers either the form of the kingfisher, with its long sharply-pointed beak,

and beautiful blue and green upper parts relieved by a buff or even yellow breast, or its nest in a clay bank or decaying tree-stump, containing pure-white roundish eggs. The numbers of kingfishers vary extremely with the locality and with the season. In the southern portions of the North Island, for example, there are many districts where the kingfisher may be reckoned a rare bird. In the North Auckland Peninsula, however, it is one of the commonest of birds, and it is there, consequently, that it enters into the closest relations with agriculture, and there, moreover, that a request has been recently made to deprive it of all protection, in order that its numbers may be thinned.

The kingfisher is extremely plentiful also in the actual vicinity of Auckland, whence the writers have had the good fortune to receive the following authoritative notes by Mr. R. A. Falla, R.A.O.U., than whom there is in New Zealand no more reliable ornithologist :—

Notes on the Food of the New Zealand Kingfisher.

Of the widely distributed family of birds known collectively as kingfishers only one small subfamily is structurally adapted for living exclusively on a diet of fish. These, represented by the common kingfisher of Europe, have a narrow spear-like bill, compressed and grooved to give it cleaving-power, and the very short tail common to most diving-birds. The other extreme is represented by the laughing-jackass type, which has a heavy bill broadened for holding small reptiles, and strengthened for crushing.

The New Zealand kingfisher is structurally nearer to the latter type, and one would expect to find his diet regulated accordingly. This seems to be the case. Although he has just sufficient resemblance to his English relative to enable him to fish rather clumsily when opportunity offers, his regular diet consists of almost every kind of living creature except fish. The following notes refer to the Auckland District, where the kingfisher is probably more common than anywhere else in New Zealand, and are based on close observation at all seasons of the year over a period of eight years :—

Crabs : As probably 90 per cent. of the kingfishers in the district live on the banks of tidal creeks and estuaries, where they appear to feed exclusively on small crabs, these form the most important item as far as this district is concerned. The concrete casing of the drain which runs across Hobson Bay is often dotted for its whole length of over a mile with the pellets of indigestible parts which the bird voids from its crop. One day's collection of these pellets contained the remains of over a thousand small crabs.

Crickets : The inland birds are mainly insectivorous. They usually stay the whole year round in one locality, and feed on whatever insect is most abundant at the time (and suitable for food). In the spring of 1917 the kingfishers at one end of the Auckland Domain appeared to be living on crickets, judging from the few pellets found (they are more difficult to find among trees and vegetation).

Other insects : The birds under observation in the Domain, as noted above, varied their menu at different seasons. During some months they frequently hunted in the vegetable-gardens, but I could not always discover what insects they were taking. Ants often appeared to be the victims. They seem to prefer larger insects when obtainable, and are frequently seen with dragon-flies and cicadas. Soft-bodied larvæ were seen being given to the nestlings on several occasions.

Worms : Kingfishers have a very quick eye for the slightest appearance of an earthworm, but do not seem to get many.

Mice : I have seen a bird with a well-filled neck and a mouse-tail hanging out of its bill.

Lizards : My observations here include only half a dozen cases of kingfishers being seen with lizards, although Guthrie-Smith states that at certain times lizards form nearly all their diet.

Small birds: I have seen kingfishers once or twice battering white-eyes' bodies, which presumably they swallowed later.

Fish: On the only occasion on which I saw a kingfisher actually engaged in fishing the bird made an awkward dive into a pool (flopped in) and fluttered out without anything visible in its beak. It may even have been after fresh-water insects or tadpoles.

The habit of throwing up pellets containing all the indigestible portions of the prey—shells, fur, feathers—is shared also by the owls. It obviously offers a striking opportunity to gain an accurate knowledge of the birds' diet, and renders possible the comprehensive survey which Mr. Falla has supplied. It should be remembered that this account claims to deal with the kingfisher's habits in one district only. Probably in certain other districts fish form a larger proportion of the diet than in the vicinity of Auckland; but this is unquestionably not the case in the North Auckland Peninsula as a whole. There the chief food consists of crabs, crickets (*Gryllus servillei* Sauss.), long-horned grasshoppers (*Xiphidium semivittatum* Walk.), and probably locusts (*Locusta migratoria* Linn.). The luxuriant summer growth of paspalum harbours immense numbers of crickets and grasshoppers. Crickets constitute a veritable pest, particularly abundant on recent bush-burns, where much of the young grass is destroyed by them and establishment frequently delayed. This large black cricket is believed to have been introduced from Australia. In the North Auckland district it has increased to a phenomenal extent, so that it is no uncommon occurrence to surprise as many as thirty or forty beneath every dry cake of cow-dung turned over in a pasture. Cases are known of large holes being eaten by these voracious insects into coats laid temporarily on the grass. The writers believe that the unusually large numbers of kingfishers in the peninsula are due to the tremendous access of food supplied by the crickets. It is an incontrovertible maxim of economic ornithology that, within wide limits, birds eat the food which is most easily obtained and most abundant. Unquestionably the most plentiful kingfisher-food in the north of New Zealand is formed by the seething grasshopper and cricket population of the northern grasslands.

In Australia, where an almost identical form of our species is known as the "forest kingfisher"—a name in itself significant—the stomachs of those examined by Cleland and his associates contained fresh-water crayfish, weevils and other beetles, and locusts and grasshoppers. In the summing-up it is described as a useful insectivorous bird.

The English kingfisher, which gave its name to the whole family, is, as Mr. Falla points out, structurally fitted to live almost exclusively on fish, yet it is rigorously protected in England. When the early naturalists found in other lands birds of the same family living entirely on land-animals, dwelling in the forest miles from water, they realized the inappropriate nature of the name "kingfisher," and suggested instead that of "kinghunter." The latter title should rightly be applied to the New Zealand species; but so firmly fixed in the language is the former name that change is almost impossible. In the attempted persecution of this bird as an allegedly serious enemy of trout the writers are unable to see any other justification than that afforded by the proverb "Give a dog a bad name and hang him."

THE LONG-TAILED CUCKOO (URODYNAMIS TAITENSIS SPARR.).

The long-tailed cuckoo, or koheperoa, is one of New Zealand's three regular migrants, breeding here in summer and spending the winter in the tropical islands of the Pacific—Fiji, Samoa, the Solomons, the Marquesas, and other groups—thus accomplishing twice yearly a journey of over a thousand miles. Its plumage, barred with dark brown, and its excessively long tail, render it quite unmistakable. Fulton has published a very interesting account of this bird, from which much of the following information has been gathered. His paper is so exhaustive that the work of the present writers has been able to add very little to it.

The most interesting feature of this, as of most other cuckoos, is its well-known habit of delegating its parental duties to other and usually smaller birds by depositing its eggs in their nests. The disproportionately large nestling is assiduously fed and reared to maturity by the devoted foster-parent. Having regard to the interest of this habit, and of its familiarity to all, it is truly remarkable that so little is known as to the foster-parents of the long-tailed cuckoo and as to the method of depositing its eggs in strange nests. Young cuckoos of this species have been found in nests of the yellow-breasted tit, the whitehead, and the yellowhead. The grey warbler, South Island robin, brown creeper, tui, white-eye, bell-bird, and pigeon are all—on more or less circumstantial evidence—said to act on occasion as foster-parents. Further observations on these points would be of the greatest interest.

The habits of the koheperoa, largely on account of its noiseless flight and semi-nocturnal activity, are shrouded to a considerable extent in mystery. One point, though, is clear — the unsavoury reputation borne by cuckoos the world over as stealers of birds' eggs and killers of young birds is entirely merited by our long-tailed cuckoo. The detailed researches of Fulton indicate, however, that most of its energies in these directions are bent not on the indigenous and insectivorous bush-birds, but on the introduced small birds which in many localities form a pest of the cultivator. A few quotations will make this clear. "I have seen a cuckoo repeatedly with young birds in its bill, and have examined the nest after the cuckoo has been at them, and have found nothing but the shell of the egg left. It chiefly robs sparrows' nests. . . . I have seen one go into a red-pine tree and take from a hole in the trunk a young sparrow, fly into the scrub with it, and in a short time return and repeat the performance with another nestling." Other birds or their eggs taken by the long-tailed cuckoo include introduced thrush, linnet, bell-bird, brown creeper, and introduced blackbird. Fulton states further: "There are very few instances of egg-robbing recorded, and those only since the introduction of English birds, and, as the natural food of the cuckoo has become scarcer, the bird has acquired the habit of helping itself from the nests of those who have largely been responsible for the diminished food-supply. Many of my correspondents state that the cuckoo is now more common than it used to be, and attribute this to the abundance of imported birds. . . . Imported birds seem to live and breed in the vicinity of cultivated country, consequently near townships their nests and young are much more easily found and are much more numerous than

the native ones, and it seems to me that the cuckoo is living on the eggs and young of these birds; and, as they are more numerous near dwellings and gardens, the cuckoo also comes closer, and is more in evidence than it was. . . . I think that if the matter is gone into it will be found that the cuckoo does the best he can towards combating the sparrow plague."

The long-tailed cuckoo, then, must be considered an enemy of the introduced small birds, against which have been introduced barn-owls and more recently the little owl. The whole question of these introduced small birds will be dealt with fully in the later articles of this series. At the present time it must suffice to state that even if certain species of them are doing more good than harm, many of them are such that an all-round reduction of their numbers would render them less liable to attack crops, and would thereby increase the percentage of good services rendered by them. Such are probably the house-sparrow, the yellowhammer, the skylark, the starling, the mina, and the rook.

THE SHINING CUCKOO (LAMPROCOCCYX LUCIDUS GM.).

It is probable that many people know the characteristic whistle of the pipiwharauroa and are yet entirely unfamiliar with the appearance of the vocalist. This little bird, with its distinctly barred breast and beautiful bronze-green back, is another of our few migrating birds. In its case, however, according to the recent researches of Mathews and Iredale, the winter home is quite unknown. Formerly it was believed to winter in northern Australia, but now (although proof is lacking) it appears that New Guinea is more probable.

The most frequent foster-parent of the shining cuckoo, or "whistler," is the grey warbler; but cases in which the white-eye, the yellow-breasted tit, and even the house-sparrow acted in this capacity have been recorded. In the case of the grey warbler, with its covered-in nest (see *Journal* for August last, p. 80), it would seem almost impossible that the cuckoo can enter and actually lay her eggs in the nest-cavity. It seems almost certain that she must lay her egg upon the ground and deposit it in the nest with her bill. In this connection Mr. P. Keegan, of Whakatane, writes, under date 27th September, 1922: 'When a lad on Banks Peninsula I often watched the shining cuckoo placing an egg in the grey warbler's nest. A cuckoo would approach the nest, and the two warblers would make a fierce attack on it. The cuckoo would lure them away some distance. Then its mate would dash in with an egg in its beak and place it in the nest." Other foster-parents mentioned by Fulton are fantails, robins, tomtits, blackbirds, and sparrows.

The shining cuckoo shares with the well-known English cuckoo and other typical members of the family the ability to eat hairy caterpillars, which are usually believed to be distasteful to other birds. It is true that McAtee considers that hairy caterpillars in general are by no means so objectionable to birds as is usually supposed, and he instances the English house-sparrow destroying large members of the white-marked tussock-moth caterpillars (*Hemerocampa leucostigma* S. and A.); but there cannot be the slightest doubt that cuckoos are better adapted than other birds to this diet, and in actual fact they do make a specialty of hairy larvæ. The same author describes the yellow-

billed cuckoo (*Coccyzus americanus*) and its method of treating the hairy tent-caterpillars (*Clisiocampa americana*). It squeezed out the juices and dropped the hairy skin to the ground. Mr. W. W. Smith, in this country, has watched our shining cuckoos feeding on the dark extremely hairy caterpillars of the common black-and-white moth (*Deilemera annulata* Boisd.). It proceeded in exactly the same way as its American cousin, pressing the larvæ between its mandibles and rejecting the empty skins. Among other more or less hairy caterpillars eaten by the shining cuckoo may be mentioned those of the "kowhai-moth," which Mr. G. V. Hudson considers is almost certainly *Mecyna maorialis* Felder.

So far as New Zealand conditions are concerned, it seems clear that the shining cuckoo is practically purely insectivorous, and might therefore have been granted notice in our preceding article. Fulton, however, believes that at times it feeds on the eggs of small birds—at least one of his correspondents having seen it in the act. The same writer mentions moths, daddy-long-legs (Tipulidae), caterpillars, flies, gnats, and "fruit-slugs" as appearing in the cuckoo's menu. He even quotes a correspondent who accused the shining cuckoo of eating Burbank plums; but this is, on the face of it, so utterly at variance with the general food habits of the cuckoo family that it needs confirmation before it can be accepted as true. With regard to the highly injurious fruit-slug, the larva of the pear and cherry sawfly (*Eriocampoides limacina*), the writers know of several cases in which the shining cuckoo has eaten very large numbers, and there can be no doubt that in this direction it performs a good service for the orchardist. Cleland and his associates found a closely related Australian cuckoo with no fewer than twenty-five cutworm larvæ in its stomach. They further state, "All cuckoos are evidently highly useful insectivorous birds, feeding especially on various caterpillars."

THE PARROTS.

The parrots of New Zealand include the kaka, the kea, four species of parrakeets, and the now extremely rare kakapo. Of these the kea will form the subject of an entire article at a later date; while the others are among the most exclusively forest-dwelling species of the indigenous birds, and as such have been briefly discussed in the second part of this series. The kaka, the parrakeets, and particularly the kakapo have all decreased to a very great extent under the adverse influence of bush-clearing and settlement, which deprived them of the forest habitat to which they were pre-eminently adapted, and they found it impossible to subsist in settled districts. It is true that the early colonists of the South Island saw vast irruptions both of kakas and of parrakeets, which descended in countless hordes on the cultivated areas, committed extensive depredations on various crops, and proved for a limited period a pest of the greatest magnitude; but, in spite of our ignorance of the abnormal conditions which produced these vast immigrations, it can safely be asserted that such are never likely to occur again.

The kakapo (*Strigops habroptilus* Gray) is now so rare that it need not long detain us here. As one of those especially interesting and anomalous flightless birds of which New Zealand possessed such a

unique assemblage it was one of the first to suffer from the attacks of the various predaceous animals and vermin introduced by Europeans. Its diet is almost entirely vegetarian, consisting largely of grass, moss, and similar vegetation, which it grazes almost like a mammal and of which it devours large quantities.

The Kaka (Nestor meridionalis *Gm.*).

The kaka, with its almost wholly olive-brown plumage, the bright red of the under-surface of the wings when seen in flight, and the grey crown which inspired the founder of the genus to which it belongs to dedicate it to the venerable Grecian orator, is one of the most easily recognized birds of the forest. This is the more so since its clamorous notes are not easily mistaken. The white eggs are laid on the more or less bare floor of a hole in a tree, often at or below ground-level in an entirely hollow trunk, the entrance being a comparatively small hole high up the tree.

The feeding-habits of the kaka may be conveniently discussed under the three heads of berry-eating, honey-eating, and insect-eating.

With regard to the first, the efficiency of the kaka as a seed-disperser must be impaired by its habit of breaking up with its powerful mandibles the larger seeds on which it feeds, and in this direction it would perform much less service than that prince of seed-distributors the pigeon. It must be emphasized, however, that this point should be investigated, as at present practically no data are available regarding the treatment of the different forest-fruit kernels by the kaka and by the parrakeets. It is a matter in which the closest field observations are necessary.

The tongue of the kaka is modified in a very remarkable manner as an organ for extracting the nectar from flowers. Of the latter the rata (*Metrosideros* spp.) is a favourite. The dispersal of the rata-seeds is not easily explained ; they appear too heavy to be blown far by the wind, while juicy flesh which would be attractive to birds is lacking. Guppy has therefore suggested that the seeds may become to some extent entangled in the feathers of the kaka when these heavy and active birds are busy in clamorous activity among the later blossoms of the rata.

As an insect-hunter the kaka has few rivals. Buller graphically described these birds "climbing up the rough vine-clad boles of the trees, freely using their powerful mandibles, and assuming every variety of attitude, or diligently tearing open the dead roots of the close epiphytic vegetation in their eager search for insects and their larvæ."

In summing up the activities of the kaka we cannot do better than use the words of the same ornithologist (Buller) : "It is strictly arboreal in its habits, and subsists to a large extent on insects and their larvæ, so that it is probably one of our most useful species. Where they exist in large numbers they must act very beneficially on the timber forests ; for in the dominion of nature important results are often produced by apparently trivial agencies. Like all the honey-eaters, while supplying their own wants they do good service with their brush tongues by fertilizing the blossoms of various trees, and thus assisting in their propagation ; while, on the other hand, the diligent

search they prosecute for insects and grubs, and the countless numbers daily consumed by each individual, must materially affect the economy of the native woods."

The Parrakeets.

Of the four species of these beautiful birds found in the New Zealand region, one is confined to Antipodes Island, while a second, the orange-fronted parrakeet, is apparently practically extinct. The remaining two—the red-fronted (*Cyanoramphus novaezealandiae* Sparr.) and the yellow-fronted (*C. auriceps* Kuhl)—are widely distributed over both Islands of the mainland where suitable areas of bush are to be found. Both birds are almost wholly green in colour, with a red forehead, but the crown of the head of the red-fronted is crimson, while that of its rather smaller relative is yellow. Both lay their roundish white eggs in the holes of trees.

Of their feeding-habits little of a detailed nature is known. They appear to be rather more vegetarian in their tastes than the kaka, and to subsist very largely on berries. The black juicy fruit of the tutu (*Coriaria sarmentosa*) is much relished. It is said that the Antipodes Island species feeds largely on the seeds of the piripiri, hutiwai, or "biddy-bid" (*Acaena* sp.). Reference has already been made to the vast flocks of parrakeets which visited settled areas in the early days, and from the ravages of which scarcely any kind of seeds, grain, or fruit escaped. Under such conditions the parrakeets were as great a pest as the hordes of cockatoos still are in portions of Australia; but under present conditions their numbers are so much reduced, and they are confined so entirely to the forest, that their economic importance can be considered only from the forestry viewpoint. In their present numbers they must therefore be included among the predominantly beneficial birds.

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New Rabbit District.—The constituting of the Kiwitea Rabbit District (Wellington) for the purposes of Part III of the Rabbit Nuisance Act was gazetted on 13th September.

BACON PIGS.

SUITABLE CARCASES FOR EXPORT.

K. W. GORRINGE, Instructor in Swine-husbandry, Live-stock Division.

At the present time there is much discussion in the Dominion regarding the export of pork and bacon pigs, and the early necessity for developing operations in this direction. It is not generally understood by breeders what are the requirements of the bacon-curers, and the type, form, character, age, and degree of fatness of the bacon pig most suitable for export. If it is the aim of our producers to capture a material portion of the immense amount of money paid for pork and bacon imported into Britain yearly from other countries, then they must supply what the ultimate consumer demands, as it is unreasonable to expect the intermediate exporter to pay a first-grade price for an unsuitable carcase. There is also a tendency among exporters to rush into this business when prices are fair without due consideration as to the requirements of the British bacon-curer. The latter knows what he wants in catering for the British consumer, and is prepared to pay a good price for select bacon-type carcases.

What, then, is required in a first-grade bacon carcase? Firstly, type—great length of carcase, varying from 3 ft. 6 in. to 4 ft. 6 in. from the aitch-bone knob to neck; back fat evenly distributed, averaging 1½ in. in thickness; hams not too gross; shoulders not to be heavy; and sides a nice, even width, with underline free from "seedy cut." Secondly, quality—fat to be firm and white, and lean firm but not hard. The quality of the bacon is greatly influenced by the feed used in preparing the animal for market. The injudicious feeding of large quantities of maize or beans produces a soft carcase—in trade terms called "softs"—that is, the fat is soft, of bad colour, and of an oily nature, and the lean hard and leathery. Other factors are also responsible for a large percentage of softs—namely, unthriftiness, lack of exercise, immaturity, lack of finish, imperfect feeding, undue forcing.

Why is the "select" bacon-type pig preferred by curers to the plump, full-bodied pig of the same weight? The reasons are easily explained by comparing Figs. 1, 2, and 3, which show how pigs each weighing alive about 200 lb. may yield a product entirely different. No. 1 may be described as a select Wiltshire side. This side of bacon is in appearance almost perfect. It has the required length, so that, when the ham and shoulder are cut off, the middle cuts contain the proper length, and the rest of the side a nice balance which will cut up attractively for retailers. The fat and lean are well proportioned, with the back fat about 1½ in. in thickness, and hams and shoulders of medium weight. Contrast this with No. 2. This side if shown by itself would probably appeal to breeders as very nice-looking, but by curers and retailers it would be classed as second grade or heavy. Note the extreme shortness, heavy back fat, and the

gross form of ham and shoulder. Each of these faults would preclude it ranking on the British market as select Wiltshire bacon. Fig. 3 is about as bad a side as one could wish to see. It represents the lowest grade of bacon. The back fat is of a thickness only suitable for the heavy or sausage trade, and the thin belly renders it useless for anything but thirds, or unbranded bacon. It has also a wide ugly side, a feature shunned by all bacon-curers. These types, with two or three others more or less of a bad character, are to be found in most of our curing plants to-day, and are, with the exception of No. 1, a menace to any wide expansion of the bacon industry in New Zealand.

THREE TYPES OF BACON SIDES.

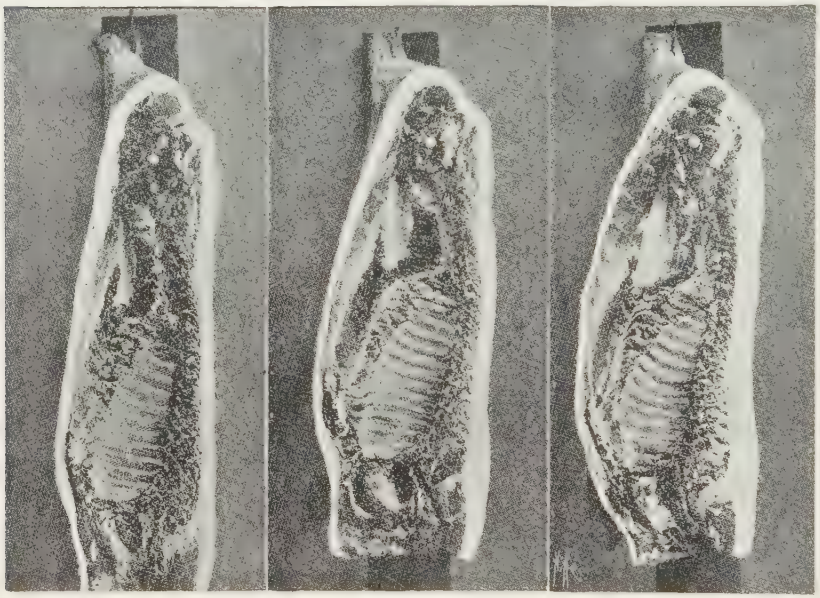

FIG. 1. FIG. 2. FIG. 3.

[*Douglas's Encyclopædia.*

The superiority of the bacon-type pig in its yield of meat over the thick fat pig was shown during a course of instruction to farmers at a Canadian curing plant. Two carcases of pigs of different grades, as exemplified by Figs. 1 and 2, were prepared for market, and each step was demonstrated to the audience. The yield in meat and waste resulted as follows :—

Live weight : Bacon type, 186 lb. ; fat type, 163 lb.

Dressed weight : Bacon type, 140 lb. ; fat type, 125 lb.

Trimmings (excluding head and feet) : Bacon type, 12 lb. ; fat type, 22½ lb. Trimmings mean the odds and ends which must be cut off hams, shoulders, and middles in order to round them off and make the meat attractive for the trade cuts. They are of small value when taken off.

The returns from these figures are instructive. The dressed-carcase returns showed 1½ per cent. higher rate in favour of the fat type, but in every instance after the bacon type was superior. The bacon type, although a heavier pig, showed a loss of 12 lb., or 8·5 per cent., against 22½ lb., or 18 per cent., in the fat type. The percentages in untrimmed loins were 13·5 for the bacon type and 12·8 for the fat type; trimmed loins showed 10·7 for the bacon type and 7·2 for the fat type. The experiment showed all through that the bacon type was better in its meat-yield.

The foregoing description should make it clear that any indiscriminate exporting of bacon pigs of the various types (notwithstanding that they have passed the veterinary inspection and are good weights and well conditioned) would be a very unwise policy, and unless a system of grading were adopted our producers and shippers might find themselves in a very unsatisfactory position in regard to their relations with British buyers, thus spoiling the good reputation already obtained from some of the pioneer shipments. That grading is playing an important part in other countries is instanced by a report on the official records at various stock centres in Canada, which show that over the whole of that Dominion only 11·1 per cent. of select bacon pigs are produced. This is from a table comprising the following classes: Selects, thick, smooth, heavy, shop pigs, lights, and feeders. It is shown that where farmers are endeavouring to produce the select type much larger percentages have been obtained, as instanced in the districts of Toronto and Montreal, which show 20·5 and 19·5 respectively, as against Edmonton with 2·4 per cent. If one compares the 11·1 per cent. of selects marketed with the fact that 85 per cent. of the Danish pigs grade select—that is, suitable for export to Britain—one then begins to realize what our position is and what our problems may be in the future

CROSS-BREEDING FOR BACON TYPE.

It has been well demonstrated by those countries which are leading in the production of the best-type bacon carcase that no purebred pig of any special breed conforms to the present requirements, which can be met only by a crossbred. The various types of purebred pigs all more or less have points which debar them from being classed as selects for export bacon carcases. There is no one special cross which excels all others in its ability to produce a first-grade carcase; the latter can be obtained in various ways. In Denmark, which produces the highest percentage of selects, a cross with the Large White boar on the native Landrace sow is general. It took a long time finally to decide on this, and the decision was only arrived at after considerable investigation and experiments, but it is now the rule. Ireland is credited with producing the longest carcase, and the Irish breeders, following out the system practised by the Danes, use Large White and Large Black (Devon) boars on their native Large Ulster sows. Canadian breeders, while using Large White and Large Black boars on different type sows, such as Berkshire and Yorkshire (Middle White), also use largely the Tamworth boar on Berkshire and Yorkshire sows.

Each of these crosses is credited with producing a first-class carcase suitable for export to Britain. The last-mentioned cross (Tamworth-Berkshire or Yorkshire) is one which we in New Zealand are largely adopting, and it is proving of great value in supplying the largest number of our select carcases to-day. The Large Black-Berkshire cross has only supplied a very small proportion, owing to the fact that breeders have been relinquishing the Large Blacks on account of

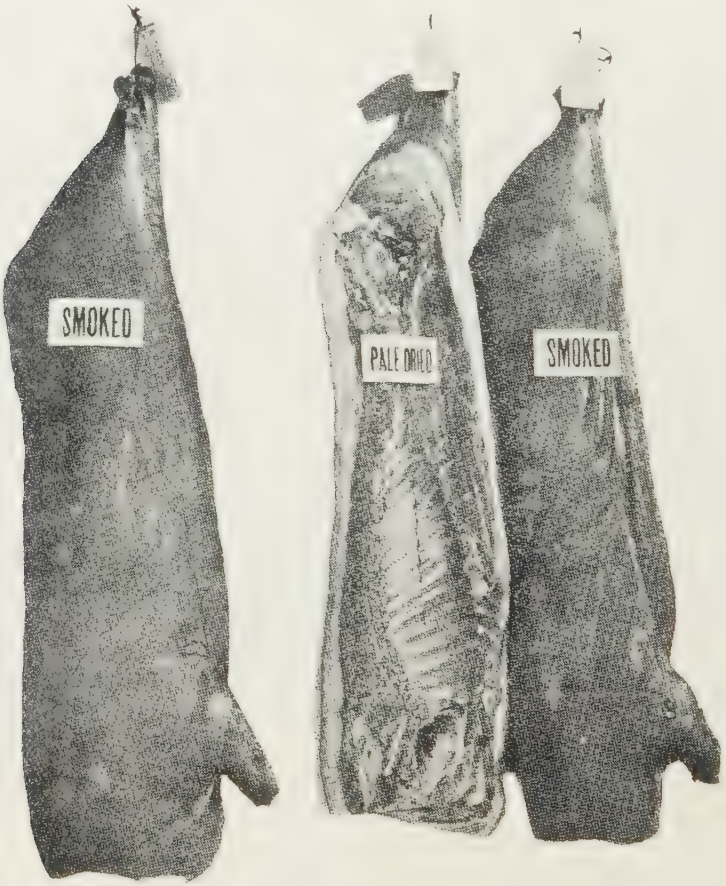

FIG. 4. TYPICAL SIDES OF IRISH BACON AS SOLD IN THE BRITISH MARKET.
[*South Australia Journal of Agriculture.*

weakened constitution brought about by inbreeding through the want of new blood. This state of affairs may be remedied in future, however. Some high-class representatives of the Large Black and Large White breeds have been presented in England to the New Zealand Government, and it is proposed in due course, after arrival, to place these pigs at one or more of the Agriculture Department's farms. The progeny would subsequently be at the service of breeders. This is a step in the right direction, as it will place us in the position of having in the

Dominion the three largest and longest types of pigs to choose from, which will be invaluable for crossing with our other types for bacon purposes. Of the three, the Tamworth is at present doing the pioneer work and is being accepted by breeders all over the Dominion. The other types will take their place in due course, as breeders wish to use them.

It is well to mention that the Large White has one objection—that is, its liability to sun-scald. This might produce a considerable

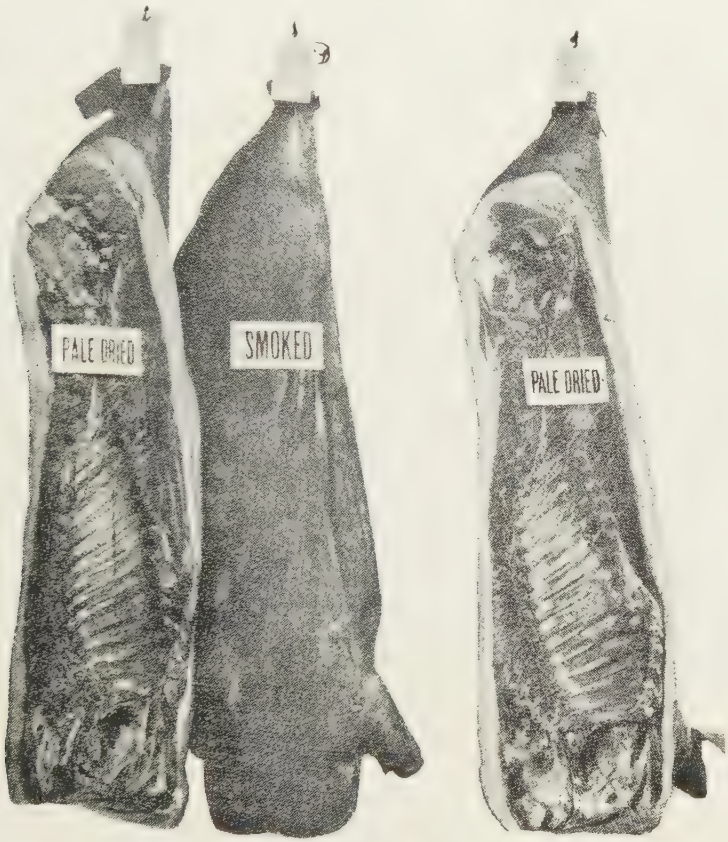

FIG. 5. TYPICAL SIDES OF DANISH BACON AS MARKETED IN BRITAIN.
[*South Australia Journal of Agriculture.*

proportion of unsightly carcases which would be rejected for export, unless special provision is made on the farms for the pigs to be protected by natural shade or artificial shelters. An objection also is raised against all the black breeds by British high-class grocers—that these breeds produce a carcase with the underline discoloured, this being called "seedy cut" or "black belly." This is considered a disadvantage in their business, as the cuts from that part of the carcase—namely, "prime streaky" and "thin streaky"—often fetch

higher prices than prime loin cuts. White pigs do not have this defect, nor do some of the coloured breeds, of which the Tamworth is one. The question of "seedy cut" has not been considered by our breeders to be of any importance so far as local requirements are concerned, but it must be taken seriously when exploiting the British market, and breeders are advised to make it a strong point when selecting their types for future breeding.

CONCLUSION.

In conclusion, farmers are advised not to allow prejudices in regard to a certain type of pig to overrule them in their future operations. Prejudice can be carried too far in relation to live-stock, especially pigs, and may result in retarding the expansion of the bacon industry. They should keep in mind the requirements for overseas trade, and build up to that standard, establishing harmony between producer and exporter, together with the confidence of the British curer. The possibilities are here in New Zealand with its exceptional facilities for the breeding and growing of pigs, and given proper organization there is good reason to anticipate the building-up of a large export trade.

LUCERNE-GROWING IN SOUTH AUCKLAND.

EXPERIENCE OF A CAMBRIDGE STAND.

T. H PATTERSON, Instructor in Agriculture, Auckland.

LUCERNE is undoubtedly gaining in popularity in the Auckland Provincial District, and the total area devoted to the crop has steadily increased during the last five years. A number of co-operative trials have been carried out between different farmers and the Department of Agriculture, and much useful information gained, of which the following record is a good example.

In 1920 Mr. L. B. Dougherty, of "Green Hill," Cambridge, decided to put an area of 5 acres of his dairy farm into lucerne. He applied to the Department at Auckland for advice. A co-operative trial was set out with the object of demonstrating the value of cropping preliminary to sowing in lucerne, and later to try some control measures for root fungus (*Rhizoctonia medicaginis*). This root parasite has shown up on many areas of lucerne in the Waikato and Bay of Plenty during the last five years.

The area was ploughed out of permanent pasture in August, 1920, and sown in soft turnips in December following. The crop, owing to unfavourable weather, proved a comparative failure. In the following autumn (March, 1921) the ground was prepared for barley and vetches. This crop did well and was grazed off with pigs.

The soil was ploughed in the August following, disked twice in September, and 16 cwt. of ground limestone was applied on 23rd of that month. It received two strokes of the tine harrows on the following

day, and was rolled two days later with the Cambridge roller. On 14th October the paddock was cultivated with the spring-toothed cultivator to kill weeds and loosen the surface. On 14th November, late in the afternoon, 3 cwt. of inoculated soil per acre was applied, and the area was immediately tine-harrowed twice. On 16th November it was rolled, and sown on the following day. Four acres were sown with 10 lb. per acre of Hunter River seed in 7 in. drills. The following manure-mixture was applied with the seed: Superphosphate, 2 cwt.; ground rock phosphate (Nauru-Ocean), 1 cwt.; sulphate of potash, ½ cwt. One acre was sown with 10 lb. per acre of Grimm lucerne.

The season proved very wet, and weeds grew strongly. Before the first cut was made on 1st February, 1922, the lucerne looked hopeless on account of weeds—mainly annuals. After the lucerne was cut and

MR. DOUGHERTY'S STAND OF LUCERNE.

Photo taken 26th January, 1923, just before cutting second crop of season. Lucerne not yet in flower.

stacked the area was tine-harrowed twice and was made much cleaner. On 10th April the second cut was made, and there was still more weed-growth than lucerne. It was again cultivated, using this time the tine cultivator. In May the tine harrows were used again. In early June dry dairy cows were put on, and the lucerne was grazed. This procedure left the area clean for the winter. From 8th to 24th August the tine cultivator was used to clean out weeds, and the area was top-dressed with a mixture of superphosphate and ground rock phosphate (Nauru-Ocean).

The first cut of the 1922–23 season was made on 14th December and stacked later. Though somewhat weedy, it made good hay. The area was again cultivated with the tine cultivator after the hay had been taken off. The second cut, made in the last week of January, was very

satisfactory. The lucerne was practically free of weeds, and the vigour of the stand was apparent on inspection. The accompanying photo was taken just previous to cutting.

As yet no root fungus has appeared in the crop, though it is found in the district. It is hoped that the vigour maintained by good treatment will enable the lucerne to become resistant to invasion.

COMMENT.

A lucerne crop should never be considered hopeless so far as weeds are concerned. This is especially the case in the early stages of its establishment. The wet, cool summers of the last two seasons made the eradication of weeds extremely difficult. Normal summer weather would have made the task easier. Despite the unfavourable weather, however, the weeds were conquered in Mr. Dougherty's case. Liming, of course, is necessary. Top-dressing with phosphates consisting mainly of superphosphate may also be regarded as essential. This, added to the cutting, assists materially in the control of weeds.

After experience with both methods, I am of opinion that lucerne sown after a clean permanent pasture is better in many cases than resorting to preliminary cropping. The grass-sod should be broken in early winter by skim-ploughing, and the area reploughed deeply in the spring following. It should then be worked down, limed, and sown about November. Comparing broadcasting with drilling, I would advise on the lighter soils, such as those of Waikato, Bay of Plenty, and elsewhere in the province, sowing broadcast. Drilling half the seed one way and crossing the area at right angles with the remainder is to be recommended.

The importance of regularly top-dressing and cultivating after cutting, for the maintenance of a vigorous stand free of weeds, cannot be over-emphasized.

In the south Auckland district dairy-farmers particularly can use profitably a small area—up to 10 or 15 acres—of lucerne. It reduces the area that need be devoted to special crops. Cutting permanent pasture regularly for hay is not recommended, because the growth produced when the field is shut up does injury to the better grasses. It must not be forgotten also that lucerne is the highest-grade crop that can be produced from the nutrition point of view; moreover, it leaves the soil in an improved condition after the stand is broken up.

Inspection of Farm Engines. — The Board of Agriculture has in the past endeavoured to obtain exemption from inspection for farm engines and motors of less than 6 horse-power, as it is recognized that practically nothing is achieved by such inspection. An amendment to the Inspection of Machinery Act was introduced into the House last session, and was referred to the Labour Bills Committee for consideration, but went no further. At its last meeting the Board decided to take up the matter again in due course.

Registration of Apiaries.—The total number of registered apiaries at the close of the last official year was 8,007, representing a total of 111,100 hives.

PREVENTION OF THE SPREAD OF STOCK-DISEASES.

FUNCTIONING OF STATE VETERINARY SERVICES.

Presidential Address by Professor H. A. WOODRUFF, of Melbourne, to the Veterinary Section, at the Annual Meeting of the Australasian Association for the Advancement of Science, held at Wellington, N.Z., January, 1923.

IN accepting the invitation to act as President of this Section owing to the very regrettable absence of my friend and colleague Dr. S. S. Cameron I was not unmindful of the duty devolving upon me of preparing an address for your consideration. The choice of a subject was by no means an easy one, but for a number of reasons the one selected was thought to be appropriate: Firstly, because the stock interest, both in New Zealand and in the States of the Commonwealth, is a very important interest, and in relation to world requirements of food and clothing is one of growing importance; secondly, because of the absence of many of the most serious contagious diseases of animals in Australia, and even more in New Zealand (to use the words of an old writer, "Let him that thinketh he standeth take heed lest he fall"); thirdly, because of the necessity for the introduction of purebred stock from abroad for the maintenance and improvement of the excellence of our stock here; and, fourthly, because we as a profession have the responsibility of advising the Governments of our respective States in this matter, and with every increase of our scientific knowledge of the incidence and causation of stock-diseases our advice will require to be modified and adjusted to fit the known facts.

There is little need to spend time in reminding the majority of my audience of the ravages made by some of the more virulent contagious diseases of animals in the older countries of the world, but it may be that some of my hearers are not familiar with the magnitude of the losses which have occurred, and which have compelled Governments in all civilized countries to institute and organize a veterinary sanitary service.

"In Great Britain up to the time of the invasion of the cattle-plague in 1865 it may justly be said that veterinary sanitary science, except in the Army, had no existence so far as the prevention of contagious disease is concerned. In 1865 cattle-plague was introduced into England on 24th June. In October it was calculated that 17,000 cattle had been affected. In November only four counties in England were exempt, and the malady was present in nineteen out of the thirty-three Scotch counties. Further, during 1865 and 1866 some 279,000 cattle were reported sick, and 233,000 died or were killed."* But in addition to cattle-plague other stock-diseases were taking toll of the national wealth. "Up to 1869, for thirty years since the introduction of the two contagious maladies, foot-and-mouth disease and bovine pleuro-pneumonia, it was estimated that the loss from these alone amounted to five and a half million cattle, roughly valued at eighty millions sterling."*

* *Veterinary Sanitary Science and Police*, vol. 1. (George Fleming.)

Even in recent days just prior to the war and with an organized veterinary staff the losses due to foot-and-mouth disease alone in European countries were immense. "In August, 1911, 37,000 outbreaks of foot-and-mouth disease were recorded in Germany; in July of the same year 12,000 were recorded in Belgium, and 4,000 in Holland; in France there were 16,000, and there it was estimated that the loss would amount to over fifteen millions sterling." (Sir Stewart Stockman.)

In those earlier days before the advent of a State veterinary sanitary service it is not surprising that contagious diseases of animals should have spread from country to country, and one has only to read the theories of the etiology of what we now know to be specific contagious diseases to understand how entirely uncontrolled and, indeed, uncontrollable they appeared to be. So long as "spontaneous generation" was believed to be possible, and when mysterious miasmatic and telluric influences were thought to be all-sufficient factors in the causation of disease, preventive measures were clearly impossible.

Now, this inability to control the spread of disease coincided in point of time with a very natural desire on the part of colonists in different parts of the Empire to import high-class pedigree stock from Great Britain in order to establish purebred studs and to improve stock generally. Thus the chances of introducing into Australia and New Zealand the prevailing animal-diseases from Europe were considerable, and it is probably owing mainly to the length of the sea voyage that comparatively few of the animal scourges found their way in. On this point it has to be remembered that races of animals which have for many generations been free from any particular contagion are, generally speaking, in a highly susceptible condition should the chances of infection ever occur. This, indeed, makes it the more surprising that in the case of some of the actively contagious diseases which have been introduced into Australasia they have not spread far from the primary infected place.

The wonder is not that bovine pleuro-pneumonia was introduced into Australia in 1858 and spread over the majority of the States (Fleming, vol. 1, p. 407), but that, having been introduced into New Zealand in 1864, it did not become widespread. Equally remarkable is the fact that sheep-scab, having been introduced and spread to several of the Australian States, should have been eradicated. Again, it is surprising to learn that foot-and-mouth disease—that most contagious and most elusive disease of stock—should have been introduced into Victoria in 1872, and yet that the outbreak was confined to the initial herd, and following destruction of the entire herd, on the advice of the late Graham Mitchell, M.R.C.V.S., that it spread no further.

In the case of those diseases with long incubation periods, such as glanders in horses and rabies in dogs, it is extremely difficult to understand the immunity of Australia and New Zealand. Glanders was, indeed, introduced into Sydney in a troupe of circus-horses which had been brought over from America. On inspection at the port the existence of glanders was recognized by the late Edward Stanley, F.R.C.V.S., the affected horses were at once destroyed, and the rest of the animals quarantined on an island. But what a stroke of fortune

that the disease should have been in a clinically recognizable form in these pre-mallein-test days! For the detection of these enemy aliens and their prompt suppression great credit is due to the early veterinarians. Even the first outbreak of contagious bovine pleuro-pneumonia in Australia was diagnosed by the late Henry Wragge, M.R.V.C.S., while still confined to one herd, and slaughter of the entire herd was advised. Action was, however, delayed pending inquiry by a Royal Commission, and the delay proved fatal indeed.

One factor of importance in limiting the spread of contagion in Australia a generation ago was probably the sparseness of the cattle population and the comparatively few sales and transfers of stock as compared with conditions in Europe.

There are, unfortunately, other diseases, insidious, unknown, unsuspected at the time, which have succeeded in getting in, piroplasmosis or tick-fever being a notable example. In this case there is no authentic information as to how and when the cattle-tick [*Margaropus australis* was introduced into Australia, but according to the evidence collected by Gilruth it appears probable that Asiatic Brahma cattle imported from Batavia in 1872 were responsible, although the first serious mortality to be recorded was not till 1880, in a mob of cattle introduced from Queensland into the Northern Territory.

But now consider some more recent outbreaks of contagious disease in countries where the diseases were—although for the time being foreign—quite well known, and therefore more or less thoroughly guarded against. The return of army horses to the United Kingdom after the South African War coincided with an increase in the number of outbreaks and number of animals attacked with glanders, and this marked increase continued from 1901 to 1907. But, besides the dispersal of ex-army horses, another factor operated and was probably of greater importance—namely, the failure of the authorities to deal with "in-contacts" after discovering a clinical case, and the private use by the owner of the mallein test, followed by the sale and dispersal of apparently healthy reactors. Therein is a lesson which is capable of application in connection with other diseases.

A further disease of horses, epizootic lymphangitis, was introduced at the same time from South Africa, and it is highly creditable to the veterinary profession that within a year or two it had been completely eradicated and is now unknown in Great Britain. Still another example of unconscious introduction of disease into a country is furnished by New Zealand, in the case of anthrax conveyed in bone manure from India and elsewhere. The success of the practice of bone-sterilization and the freedom of the Dominion from anthrax in recent years are greatly to the credit of the veterinary staff of the Department of Agriculture and to our old friend Dr. J. A. Gilruth.

Foot-and-mouth disease has furnished many examples of unconscious introduction despite all kinds of precautions, among them an outbreak in Edinburgh some years ago, which was eventually put down to infection by means of hay or straw either intended for fodder or used for packing eggs from Holland. This latter possibility is one which is not easy to guard against, but must remain under suspicion, to be investigated whenever unexplained outbreaks occur.

Even more insidious was the introduction of foot-and-mouth disease virus in vaccine ("Vaccinia") lymph imported commercially into the United States from Japan in 1902 and 1903. The long period during which the vaccine remained infective, and the very mild type of foot-and-mouth disease set up, increased the difficulty of proof, and remain serious factors to be reckoned with in the importation of biological sera and vaccines from abroad. Many more recent outbreaks of this disease in Great Britain are of unexplained origin, but with the great prevalence of the disease in neighbouring countries this is not so difficult of understanding, and we in Australasia can reckon on a much greater immunity because of our much greater distance from infected places.

Another disease of some concern to us must be mentioned—namely, dourine of horses. With its pristine home in Asia, this disease has also been prevalent for a long time in North Africa, and was apparently introduced into Europe by means of Arab stallions in the early years of the nineteenth century. The disease was first suspected in the United States in 1885, and recognized by W. L. Williams in 1886. The introduction was traced to a Percheron stallion imported from France in 1882. From Illinois State the disease spread to Nebraska, and for over twenty years various outbreaks—more or less serious—were traceable to this primary importation. Canada became affected in 1904, but by strenuous measures had the disease well under control by 1909, and eventually successfully stamped it out. A fresh outbreak was discovered in the United States in 1911, in Iowa, and this in turn was traced to the importation of a Percheron stallion from France in 1909. France is being continually reinfected by the movement of stallion asses to and from Spain, where the disease is commonly prevalent.

The recent introduction of rabies into Great Britain after a period of freedom lasting many years is not difficult of explanation. The extraordinary traffic to and from the Continent during the war, and especially the home-coming of many thousands of soldiers anxious in many cases to retain canine pets and mascots, readily account for the introduction of so wily an invader as rabies. Australia and New Zealand ran considerable risk of suffering the same invasion, but the strictness of the authorities and the general good sense of officers and men returning home were successful in preventing what would have been a very serious occurrence. The veterinary authorities in Great Britain are to be congratulated on the success of the energetic policy of control and eradication, and once again Great Britain can be declared free from this disease.

The last outbreak of contagious disease to be mentioned in this group of surprise importations, and in many ways the most dramatic, is that of cattle-plague in Belgium, in August, 1920. This disease had been unknown in Western Europe since 1870. It had been the cause of the initiation of veterinary sanitary services in most European countries, and all chances of its reintroduction were thought to be well guarded against. The facts are that a cargo of zebras from British India and consigned to Rio de Janeiro touched at Antwerp, where the animals were disembarked at the quarantine station pending reshipment on another boat. Some of these animals died in the quarantine station, but no *post-mortem* examinations were made, and

cattle-plague was not suspected. The survivors were transhipped and proceeded on their voyage. Then other shiploads of cattle imported for food purposes came into Antwerp, passed through the quarantine station, and were distributed to various abattoirs. In the Ghent abattoir the disease broke out—but its real nature was still unsuspected—and then by one unfortunate happening the general spread of infection began. A consignment of German cattle sent over for reparation purposes came into the Ghent abattoir, and were then dispersed to various country districts. So the disease spread, and its real nature was discovered. The lessons to be learned are sufficiently obvious.

In addition to these more serious contagious diseases there are a number of parasitic diseases which require consideration at the hands of the State veterinary authorities. Notable examples are the conditions due to the ox-warble (*Oestrus bovis*), the sheep nasal bot (*Oestrus ovis*), and the worm nodule of cattle (*Onchocerca*). The failure of the ox-warble to become acclimatized in Australia, despite its inevitable importation in the early days and its escape from quarantine on several occasions during recent years, is not readily explained. Symons, in a paper read before the Australian Veterinary Association in Sydney last year, brings forward evidence to show that in no country in the Southern Hemisphere is the ox-warble established. On the other hand, the nearly related nasal bot-fly of sheep has got a firm hold in Australia, and is proving a source of considerable loss in lowering the condition of sheep, although it rarely causes any mortality. What are the factors which account for the different behaviour of these two parasites in a new country I am quite unable to say. In the case of *Onchocerca* it may be said that the species common in northern Australia, or nearly related species, are found in many other parts of the world. There is, however, no evidence to show that the infection is spreading southward in Australia, and in Victorian cattle, at any rate, cases are practically unknown. There, again, the life-history and the vital factors are as yet unknown.

But now the question arises, Are we, through ignorance or inertia, or both, allowing the introduction of various fresh contagious diseases of animals into our erstwhile clean country? Are we perpetrating similar disastrous errors to those committed by our forefathers? I think that with regard to at least two diseases of cattle we shall have to plead guilty—namely, contagious abortion of cattle and Johne's disease or pseudo-tubercular enteritis. With respect to the former, the mischief has already been done. We erred through ignorance in the days before definite diagnosis was readily possible. With regard to the latter, we are probably now sowing the seed—largely for want of serious concern—of a harvest whose magnitude it is impossible to assess.

About bovine tuberculosis I have said nothing, since the distribution is already practically world-wide, and also because tuberculin testing of imported cattle is practically universal. Some regulation of inter-State traffic will be called for in Australia if and when a forward movement commences in any State for the eradication of the disease. In this connection the procedure under the accredited herd system and the standardization of the tuberculin test in the United States deserve careful study.

A POSITIVE POLICY.

And now, having surveyed very cursorily the field of possible importations, may I be allowed to put forward the positive policy which it is the main object of this address to commend to you. It may be stated in a number of propositions as follows: (1) The chances of the importation of infection are numerous, and every known chance has to be guarded against; (2) the interests involved are economically very important; but (3) the necessity for pedigree-stock exchange between the various States and countries is also extremely important; and (4) the modern scientific methods for the detection of disease-infection are incomparably greater than those of a generation ago, and they are being improved and added to daily; (5) thus it behoves the veterinary profession in general, and Government veterinary advisers in particular, to revise continually their methods and regulations, their prohibitions and exemptions, so as to allow the maximum facilities for trade and for importation and exportation of stock, while at the same time affording all the protection which science can devise. This protection will not only apply to well-known recognized dangers, but will look forward to possibilities of danger from sources hitherto unsuspected.

Veterinarians in Great Britain have often been taunted that their most important instrument for the control of contagious disease was the pole-axe. The further taunt has been applied to Government veterinary officers that their only policy to exclude contagious disease was rigid exclusion of all animals from abroad. I venture to put forward the view that our increased scientific knowledge should be used wherever scientifically possible in relieving this drastic and rigid policy. In order to be in a position to approve this view, let us briefly survey the various methods available for the exclusion of infection from a foreign source.

(1.) The first method is the most obvious and direct—namely, the prohibition of importation of live animals from any country where contagious disease of animals exists. Rigidly interpreted and administered, this method provides a very real protection against the introduction of infection, but it is a serious restrainst upon trade in general and upon the introduction of pedigree stock in particular. It relieves the Government veterinary advisers of a great deal of responsibility, and it affords absolute protection in the fiscal sense for certain vested interests within the country.

An excellent example is afforded by the embargo on the importation of Canadian store cattle into the United Kingdom, an embargo which has just been removed. The avowed reason for the embargo was the fear of the introduction of contagious disease into Great Britain, and the particular disease which was used as a stalking-horse was contagious bovine pleuro-pneumonia. As a matter of fact, all the evidence available pointed to the entire freedom of Canada and the United States from this disease for many years, but two factors prevailed until a few months ago to keep the embargo in being. The one was the political influence of the vested interests, particularly in Ireland, which did not desire an invasion of Canadian store cattle, and the other was the departmental shirking of responsibility on the part of the Ministry of Agriculture with or without the advice of their veterinary staff.

Prohibit and keep out of trouble and responsibility seems to have been the departmental slogan. I suggest that "Importation whenever possible without danger" should be the watchword of an efficient veterinary staff, for, as has been pointed out elsewhere, while any fool can prohibit and avoid responsibility, it needs a trained man to allow importation under regulations.

(2.) Combined with prohibition of live-stock there must be prohibition of entry of animal products such as hides, hoofs, horns, bones, wool, &c., either absolute or except after efficient sterilization of such materials. Such other materials as hay, straw, and manufactured foods such as oil-cakes may also have to be provided against, and, as we have seen in the case of foot-and-mouth disease, vaccines and sera of animal origin are potential dangers. Suitable regulations and certificates, continual vigilance with regard to the prevalence of animal-disease in foreign countries, and power to promptly exclude such products as and when their importation appears to be dangerous, afford the necessary precautions in relation to these matters. Assuming now, however, that total exclusion of live animals of different species is not in operation, but that importation with safeguards is allowed, what are these further safeguards?

(3.) In the case of many diseases infection or non-infection can be determined by means of certain biological tests. The most commonly applied is, of course, the tuberculin test, and in this connection a degree of reliability can now be attained which leaves little to be desired. A standardized method of testing, using the best combined test (a matter well worthy of discussion in light of world experience), and using efficient tuberculin, applied either by the official veterinary representative of the importing country or by a Government official of the exporting country, should be required from the country of origin of the stock. In order to be able to give the necessary guarantee, both in the interests of the exporter and the importer, the British Ministry of Agriculture has established a testing-station where animals for export may be tested prior to shipment. Mallein testing of horses, asses, and mules can be applied in a similarly reliable manner, and in both cases the tests can be applied at the port of entry. Other tests which might well be applied to the animals concerned are the avian tuberculin tests for Johne's disease, the agglutination test for contagious abortion of cattle, a similar test recently worked out by Heslop for pleuro-pneumonia of cattle, and the complement fixation test for dourine in horses.

These immunological tests will surely be used increasingly, and the list of diseases allowing of their application is also increasing yearly, so that the certification by trustworthy persons in the country of origin of an animal for export will become of more and more importance. As has been pointed out, these same tests can, if desirable, be repeated at the port of entry.

(4.) Another time-honoured measure of protection is that of quarantine at the port of entry. This is a very valuable measure in the case of animals which have been only a short time in transit, and in connection with diseases with a short incubation period. It is, however, by itself an inadequate safeguard against such diseases as tuberculosis, glanders, Johne's disease, bovine pleuro-pneumonia, and rabies, while

such parasitic conditions as warbles have often outlived the regulation period. Quarantine, then, while useful, cannot be relied upon alone.

(5.) Veterinary inspection at the port of entry is, of course, an essential precaution, and if this is made to include a reference to the ship's log for any history of disease or mortality during the voyage, and repeated inspections during the quarantine period, together with application of the laboratory and biological tests previously mentioned, it affords the most solid measure of protection possible.

(6.) There are still one or two further methods by means of which a State desirous of importing pedigree stock can secure protection against infection. One of these is to require what may be called a certified history of the particular animals from the date of birth. Such a history is furnished by the breeder and owner, and is to be endorsed by the veterinary officials of the exporting State. The method rests upon the mutual honesty and integrity of stockowners and departmental officers, and, while it is necessarily limited, it does provide a means for the inter-State exchange of pedigree stock.

Another method, that of the buffer State, can sometimes be applied. If, for example, it is desired to import Queensland cattle into Victoria the latter State is safeguarded by the dipping regulations of the State of New South Wales, and by requiring a period of three-months stay of the cattle in New South Wales. This three months in the buffer State serves the purpose of quarantine.

The last method of protection to be mentioned is just that of common honesty, both in the inter-State and international relations. Honest international notification of the existence of contagious disease among animals at the earliest possible moment is still the best policy, for it becomes reciprocal, and, to apply another proverb, "Forewarned is forearmed."

VETERINARY TRAINING.

And now I desire, in conclusion, to suggest two directions in which this professional duty of allowing the fullest facilities for international trade in live-stock compatible with the safety of our own flocks and herds affects the problem of veterinary education.

Firstly, it must be clear that for the efficient performance of the duties of a State veterinary officer special qualifications are necessary. The training required for a general practitioner is not enough. The special qualifications required may no doubt be attained to a considerable extent after appointment to a junior post by the man who will read and who takes study leave for practical work in a laboratory. But I venture to suggest that a special course of training not very long after graduating is the best equipment. It is just a matter of choice between practical experience first, followed by hardly acquired scientific and technical training in a post-graduate course on the one hand, and a four-years graduation course followed by a specialized fifth year adapted solely to the scientific technical work of the State sanitary veterinarian. The one method is exemplified in the regulations for the fellowship (in this branch of work) of the Royal College of Veterinary Surgeons. The other is the method set out in the post-graduate diploma courses of some of the English universities, such as the D.V.H. of Liverpool, or the course for the degree of M.V.Sc. of Melbourne.

Just prior to the war a departmental committee was appointed by the President of the Board of Agriculture in England "to inquire into the requirements of the Public Services with regard to officers possessing veterinary qualification, and to consider whether any further measures can with advantage be adopted for the selection and training of students with a view to such employment." The committee reported that, with regard to the Indian civil veterinary department and the colonial veterinary services, in both cases there was a deficiency of suitable candidates. Further, "it was generally agreed among the professional witnesses that the course for the qualifying diploma was not of itself sufficient training for future officers in the Government service. At least a year in post-graduate work and study would be a great advantage."

This criticism of the ordinary course applies specifically to the four-years course leading to the diploma of M.R.C.V.S. in any of the affiliated British veterinary schools, but it must be equally true in principle of any graduation course which is on general lines; and a year of specialization in the laboratory, with as much field-work in the abattoir and on the dairy farm and in the quarantine station as may be, is, in my judgment, the minimum requirement for an appointment as a Government veterinary officer.

The second effect this broader view of the State veterinary officer's duties must have upon his education is that he will have a desire to continue and extend it. The British departmental committee referred to above suggest several inducements to university students possessing a thorough grounding in general science to enter the veterinary profession and the State service. Among these they rightly include special facilities for research work. I have suggested elsewhere in this address that increasing knowledge makes for increasing security and diminishes the risks of importing infection. But there are many hiatuses in our knowledge of the causation and prevention of contagious diseases of animals. Who are to fill the gaps? To the scientifically trained veterinary officer there must come practical problems demanding scientific investigation and research. If he is of the right type such problems come as a challenge. He may be qualified to carry out the research more or less alone; or he may find it necessary to seek the collaboration of the bacteriologist, or pathologist, or parasitologist, in the laboratory. What is certain is that the practical knowledge of the field officer must be combined with the scientific and technical knowledge of the laboratory worker before many of the problems of contagious disease can be solved. Further, it requires the scientifically trained officer in many cases to see the problem in its proper proportions, and in order that he may go on seeing difficulties and appreciating risks some facilities for special investigation and research must be given him from time to time.

I close, then, with a plea for an opening door to inter-State and international stock traffic, because with increase of knowledge there is increased security, and with the further plea for the employment of men of the highest standard obtainable, who with reasonable facilities and encouragement for research will continually add both to our knowledge and our security.

WATER CONTENT IN EXPORT BUTTER.

AN EXTENDED TESTING-SYSTEM FOR NEW ZEALAND.

W. M. SINGLETON, Director of the Dairy Division, Wellington.

In the earlier days of the dairy industry the manufacture of a butter of a satisfactory body and texture virtually precluded the incorporation of any unreasonably large percentages of water, inasmuch as the water could not be so incorporated as to cause the mass to be homogeneous. Water pockets resulted, and this free water at times leaked through the boxes, and thus the general appearance of the packages as well as the quality of the butter were more or less unsatisfactory. The advent of the combined churn and butter-worker has, however, made possible the manufacture of a butter which will retain a larger proportion of water that the cow has incorporated into the milk and the separator has retained in the cream. With this method of manufacture comparatively high percentages of water may be retained in a butter without spoiling the body and texture.

Britain, the greatest butter-importing country in the world, years ago fixed its maximum legal limit of water in creamery butter at 16 per cent. Practically all countries producing butter in considerable quantities have found it expedient to adopt the same legal maximum. In some of these countries a legal minimum for butterfat content has been arranged. Usually this is indicated at 80 per cent., as in Canada, the United States, and New Zealand. The Australian Commonwealth, however, has adopted an 82-per-cent. minimum for fat content, and this variation from the more generally recognized standard has caused some trouble to New Zealand dairy companies and exporting firms doing business with Australia during recent months.

The combined churn and butter-worker has to be handled with care and judgment if the operator is to succeed in turning out a butter which will not be too low in water content nor yet above the legal limit. It may be accepted that no dairy-company directorate desires to manufacture a butter which comes within either of these classes, and certainly not the latter. To safeguard the suppliers of the company against unnecessary loss in overrun, and the company against the possibility of being mulcted in fines or loss in the overseas market, it is necessary that the buttermaker should do a considerable amount of testing of the butter for water during and subsequent to the process of working.

The importer of butter into Great Britain, if found with such butter containing an excess of water, is liable to a maximum fine of (*a*) £20 for the first offence, £50 for a second, and £100 for a third offence, and (*b*) a sum equal to the value of the goods. In addition, some dairy companies have learned to their sorrow that the loss entailed in handling excess-water butter in Britain is very heavy. The business of the importer may be very much prejudiced if some of his clients who are retailers are found with butter of this nature, and the retailer's business, if he be prosecuted, may be very seriously damaged.

Continental countries exporting butter to the British market have endeavoured to protect their trade. Butter leaving Denmark for Britain, if found to contain a water content above the legal maximum, may be confiscated. Should a butter being sent from Holland be found to contain between 15½ and 16 per cent. the factory or owner, if a member of the Butter Control Institute, is penalized by a nominal fine. If the butter contains more than 16 per cent. of water the position may be met by a fine and the reworking of the butter. If this does not cause the factory to do consistently good work the registered mark or brand is withdrawn, and the factory or owner is suspended from membership, and may not use the recognized brands.

INAUGURATION OF THE NEW SYSTEM.

New Zealand adopted the usual standards of 16 per cent. as the legal maximum for water, and 80 per cent. as the legal minimum for butterfat, for butter for export as well as for local consumption. Until the 1922–23 season there was little if any complaint from Britain respecting an excess of water in New Zealand butter. During that season, however, a number of complaints were received. The Government recognizes the necessity of protecting the dairy industry—which is now of prime importance to the Dominion—and to this end approval has been given to a recommendation of the Dairy Division, which was endorsed by the various dairy conferences last winter, to the effect that the butter of one box of each churning of each lot of butter received for grading for export should be tested for water content.

Arrangements are now being made to get this service completely organized forthwith, and dairy companies may expect to receive an indication of the water content of the box examined from each churning of butter. This will inform company directorates as to the position regarding their butter, and managers will have an additional check on their working. It is not to be expected that the factory tests and the graders' tests will harmonize exactly, inasmuch as it is known that the water content of butter will vary to some extent from box to box of the same churning, and, indeed, at times, in different parts of one box. It is known that some factory-managers make a butter from which too much water has been taken. The service which will be rendered this season should tend to correct these defects, and the advantage which may be thus gained will undoubtedly more than recoup the cost of the extra assistance required at the grading-stations. The procedure is merely an extension of the existing system of testing occasional churnings, and, as in the past, no butter found to contain water over the legal limit will be permitted to be exported, and will be dealt with under the powers conferred by legal enactment.

It is hoped that under the new system the export of butter containing an excess of water will be reduced to a negligible quantity if not altogether stopped. The seriousness of the position is now recognized in the industry, and the majority of factory-managers are endeavouring to protect themselves and their companies. A smaller proportion are not so particular, and have omitted to do the necessary amount of testing of butter for water during its manufacture. In some instances insufficient care has been taken to keep the balances

and testing appliances in good order. It must not be assumed that more latitude is to be given companies which persist in forwarding for grading butter which contains an excess of water.

Although considerable testing of butter for water was done during the past two seasons, it is believed that the inauguration of this extended system will give greater assurance to those handling our butter in Britain. The Dairy Division invites the hearty co-operation of all company directorates, proprietaries, and dairy-factory managers in establishing confidence in the water content of New Zealand butter shipped overseas.

MAIZE AND MILLET FOR LAMB-FATTENING.

J. W. DEEM, Fields Instructor.

In many districts of recent years the growing of rape for lamb-fattening has become a very uncertain proposition ; in some parts, indeed, there is nearly 100 per cent. of failures. For this reason many fodder crops have been tested to ascertain if a substitute could be found.

Peas have proved themselves useful, but are rather expensive to sow, and late in coming into a proper condition for feeding. Tares and clovers are also useful. From the experience at the Moumahaki and Marton Experimental Farms during the last two seasons, however, it would appear that Japanese millet and maize are going to rank among the best crops as substitutes for rape in districts where the latter cannot be satisfactorily grown. While it must be recognized that neither of these crops will fatten as many lambs per acre as a good crop of rape, quite good results may be looked for.

In a feeding-test conducted at Marton in 1922 lambs gained 7·41 lb. per head in fourteen days on millet, and 16·5 lb. in thirty-seven days. At Moumahaki this year they gained 6·88 lb. in fourteen days on a mixture of rape and millet, and 7·04 lb. on millet alone in the same number of days. Maize for the same period gave a gain of 5 lb. per lamb.

Sowing.—Both maize and millet require sheltered warm positions to do their best, and should not be sown until warm weather sets in. In the Wellington west-coast district from 20th November to the middle of December is early enough, the first week in the latter month being very suitable. The millet sown at Moumahaki on 7th December last season was ready to feed early in January, and when stocked on 3rd February it was nearly 3 ft. high. Millet should be sown at from 16 lb. to 18 lb. of seed per acre, through every coulter of the drill. Where millet and rape are being used 1½ lb. rape and 12 lb. millet is a suitable mixture. Maize should be sown at the rate of 2 bushels per acre. Superphosphate, or two parts superphosphate with one part Ephos phosphate or basic slag, at from 3 cwt. to 4 cwt. per acre, according to the condition of the land, will be found suitable manures.

Feeding.—In order to get the best out of millet it should be divided into several breaks, and feeding started when it is from 6 in. to 9 in.

LAMBS ON MAIZE AT MOUMAHAKI EXPERIMENTAL FARM.

LAMBS ON MILLET AT MOUMAHAKI.

high. It may be left until much older, however—say, 2 ft.—but the subsequent growth is not so good. If allowed to flower there will be very little second growth. Maize is best fed in the flowering stage. If allowed to get much older the stems become rather tough for lambs, and they have difficulty in cutting them down.

Casein.—The manufacture of casein in the Dominion was extended during the season of 1922–23. Some 2,100 tons, most of which was lactic casein, was graded for export. The quality of lactic casein showed improvement, and the quality of some 100 tons of rennet casein which was manufactured was of a very high standard.

TESTING OF PUREBRED DAIRY COWS.

SEPTEMBER CERTIFICATE-OF-RECORD LIST.

Dairy Division.

THE following list comprises the record of cows which received certificates during September, 1923. It will be noticed that there are several 700 lb. and 800 lb. records, and other very creditable performances.

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		FRIESIANS.				
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Domino Show Belle*	W. I. Lovelock, Palmerston North	2 87	249·2	305	16,477·9	570·44
Brookside Colantha Princess	Cameron Bros., Stratford	2 81	248·6	271	11,479·8	331·37
Ashlynn 95th ..	Piri Land Company, Auckland	1 293	240·5	305	9,205·8	325·08
Dux Darling de Kol..	Frank Ducker, Opotiki	1 330	240·5	293	10,048·7	276·13
Senior Two-year-old.						
Fairmont Pietertje Lady	J. Hart, Tatuanui ..	2 356	276·1	365	10,860·0	720·31
Bainfield Beauty Sylvia	W. D. Hunt, Waikiwi	2 203	260·8	273	13,523·2	526·87
Junior Three-year-old.						
Peria Claudia 1st ..	J. H. Wilson, Matamata	3 19	278·9	260	9,066·7	353·04
Mature.						
Queen of Canada ..	H. R. Green, Kairanga	10 176	350·0	365	22,479·7	849·58
Clover Pledge 2nd ..	T. Henderson, Okaiawa	6 283	350·0	365	23,852·7	806·41
Ashlynn Beatus ..	Piri Land Company, Auckland	7 176	350·0	348	15,535·0	751·79
Friesland Tirania ..	R. K. Macdonald, Edendale	10 0	350·0	301	18,624·5	575·10
Hukituai Lass ..	Frank Ducker, Opotiki	6 321	350·0	356	15,685·7	468·87
		JERSEYS.				
Junior Two-year-old.						
Gowanbrae K.C. Bluebell	A. G. Griffin, Richmond	1 289	240·5	358	10,296·1	577·04
Frenaig Frisk ..	W. Holmes, Ramarama	2 23	242·8	305	10,232·0	566·43
Response	J. Magill, Normanby	1 348	240·5	365	11,104·0	503·33
Round Bush Mymy..	H. T. Mellow, Stratford	1 329	240·5	305	8,385·3	541·65
Shamrock's Jewel ..	C. Jones, Manaia ..	1 347	240·5	365	8,945·0	534·17
Ayesha's Beauty ..	C. Jones, Manaia ..	2 20	242·5	356	8,177·1	476·47
Goldie's Girl's Gift ..	G. A. Berry, Manaia ..	2 10	241·5	365	9,141·8	473·39
Bridge View Lady Hope	L. Wickham, New Plymouth	1 343	240·5	365	8,560·0	472·90
Floral Fox ..	C. B. Herrold, Waiuku	1 342	240·5	363	8,721·1	469·58
Tower View Countess	J. Nicolson, Hawera	1 312	240·5	364	7,986·4	463·65
Lady Love's Farewell	L. W. and J. T. Prosser, Leeston	2 22	242·7	365	7,905·5	451·16

* Owned by Robert Shelton, Ngongotaha.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Neat Pride's Orphan	D. L. A. Astbury, Mangatoki	1 331	240·5	365	7,925·6	439·18
Whenuku Lady Bird	T. M. Remington, Westmere	1 340	240·5	365	8,047·7	421·24
Eaton Lady Love ..	D. Watkin, Takanini	1 308	240·5	355	5,847·1	409·76
Vanetta	J. Nicholson, Manakau	1 364	240·5	349	7,517·7	407·20
Avoca Jewel ..	V. W. Nowell, Hawera	2 29	243·4	291	7,272·2	399·81
Silverdale Charm ..	H. Doel, Taumarere ..	1 229	240·5	365	7,267·1	394·90
Brookley's Baby ..	W. Johnson, Ngaere ..	1 356	240·5	351	6,545·5	393·62
Holly Oak Silvery ..	G. R. and H. Hutchinson, Auckland	2 33	243·8	365	6,890·6	392·75
Ensley Rose ..	R. F. Wilkinson, Pukekohe	1 308	240·5	365	6,389·1	385·94
Silverdale Benora ..	J. Doel, Taumarere ..	1 283	240·5	337	7,316·7	363·18
Kaucket's Oriveto ..	G. T. Gibbons, Ngaere	1 344	240·5	299	6,381·5	352·31
Rockview Crown Pearl	W. H. Fitness, Rehia	1 263	240·5	339	6,165·8	342·99
Primrose Jolie ..	A. Buchanan, Palmerston North	1 332	240·5	365	6,550·8	333·85
Brentwood Mignonette	C. A. Willis, Pukekohe	2 58	246·3	310	6,577·1	318·47
Binnia Queen ..	H. George, Kaupokonui	1 343	240·5	320	5,067·2	310·68
Remuera Belle ..	E. H. Linnell, Midhirst	1 351	240·5	345	5,907·2	302·51
Viola's Bright Lady ..	A. E. Linn, Normanby	1 332	240·5	296	5,544·4	284·54
Westwood Ideal ..	E. A. Harrington, Hukanui	1 326	240·5	328	6,758·8	282·36

GOWANBRAE OF K.C. BLUEBELL (A. G. GRIFFIN, RICHMOND).

C.O.R., 1923, Jersey Junior Two-year-old Class: 10,296·1 lb. milk, 577·04 lb. butterfat, in 358 days.

LIST OF RECORDS—*continued.*

JERSEYS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		Yrs. dys.	lb.		lb.	lb.
Junior Two-year-old—continued.						
Kaucket's Rexona ..	G. T. Gibbons, Ngaere	2 9	241·4	276	5,675·4	280·35
Waitekauri ..	T. Foreman, Alton ..	2 5	241·0	322	5,222·1	270·21
Bonny Lass o' Bon Accord	E. K. Clague, Manaia	1 270	240·5	297	3,963·0	255·80
Woodstock Claudia	E. Hofmann, Katikati	2 17	242·2	313	5,500·6	254·74
Waipiko Monica ..	Mrs. C. O'Callaghan, Tikinui	1 331	240·5	311	4,728·4	254·40
Surprise's Superior ..	T. Foreman, Alton ..	1 355	240·5	365	5,350·3	250·29
Richwood Emblem ..	W. P. Begg, Arapohue	1 288	240·5	303	4,447·3	243·31
Senior Two-year-old.						
Oakden Heather Bell	A. L. Hooper, Mahoe	2 340	274·5	365	7,394·2	508·88
Holly Oak's Primrose	G. R. and H. Hutchinson, Auckland	2 102	250·7	365	8,949·9	488·72
Lyra's Majesty ..	A. E. Phillips, Maunu	2 247	265·2	365	7,790·8	462·06
Oak Farm's Fairy Wonder	C. Meuli, Tariki ..	2 360	276·5	355	8,018·1	443·32
Wairere's Buttercup	A. Faull, Stratford ..	2 329	273·4	276	6,289·5	325·78
Three-year-old.						
Sweet Hope ..	H. T. Mellow, Stratford	3 244	301·4	346	9,710·8	601·93
Oakden Gertie ..	S. J. Hollard, Rowan ..	3 347	311·7	365	9,380·0	581·10
Society Belle ..	H. Salway, Bell Block	3 312	308·2	365	10,488·7	578·32
Riverlea Pansy ..	L. Wickham, New Plymouth	3 357	312·7	364	10,286·5	575·66
Woodside Pansy ..	G. H. Pearson, Taupaki	3 111	288·1	364	8,826·2	547·54
Ensley Jem ..	R. F. Wilkinson, Pukekohe	3 316	308·6	345	8,458·0	513·65
Volee's Hope ..	J. Nicholson, Manakau	3 334	310·4	365	9,401·3	475·93
Ginger	G. R. and H. Hutchinson, Auckland	3 281	305·1	365	7,649·2	473·67
Faithless	R. R. Dean, Te Kumi	3 172	294·2	300	8,360·7	456·41
Odette	A. L. Hooper, Mahoe ..	3 259	302·9	365	6,996·8	440·08
Orange Dale's Diamond	R. J. Wilson, Putaruru	3 286	305·6	341	8,128·0	434·89
Miss Whitefoot ..	G. Buchanan, Paeroa	3 300	307·0	365	8,046·5	431·79
Jersey Park's Myrtle	A. E. Death, Hawera	3 281	305·1	307	6,935·3	424·43
Veronique ..	R. J. Wilson, Putaruru	3 5	277·5	347	6,554·0	352·84
Victoria's Charm ..	E. A. Harrington, Hukanui	3 142	291·2	301	6,327·4	328·66
Trethella's Silvo ..	A. Buchanan, Palmerston North	3 16	278·6	360	4,503·1	283·30
Four-year-old.						
Primrose Maiden ..	H. T. Mellow, Stratford	4 333	346·8	365	9,166·4	650·99
Shamrock's Sweet Sultan	H. T. Mellow, Stratford	4 214	334·8	347	12,128·3	616·32
Serina	A. J. Hale, Hillsborough	4 259	339·4	365	9,055·6	567·71
Fairy Sweet Shamrock	H. T. Mellow, Stratford	4 255	338·9	336	9,944·6	558·68
Fancy's Pride ..	G. H. Pearson, Taupaki	4 277	341·2	365	9,335·7	535·81
Riverina Maria ..	J. Hunt, Nelson ..	4 31	316·6	295	8,904·9	482·26
Silverstream Heather	G. B. Hull, Wellington	4 31	316·6	365	9,628·7	476·83
Halcyon Era	H. Doel, Taumarere ..	4 25	316·0	349	6,618·7	420·80
Dorothy's Girl ..	E. K. Clague, Manaia	4 358	349·3	306	7,920·0	418·43
Grafton Peppermint	R. J. Wilson, Putaruru	4 291	342·6	348	7,217·2	393·05

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS—*continued.*				
Mature.		Yrs. dys.	lb.		lb.	lb.
Eaton Lady Reynecourt	D. Watkin, Takanini..	6 23	350·0	365	12,777·3	871·39
Dewberry's Maid ..	H. Salway, Bell Block	5 11	350·0	365	13,216·9	731·26
Duchess of O.K. ..	A. Faull, Stratford ..	7 11	350·0	365	11,697·2	681·67
Holly Bank Buttercup	Farrow Bros., Waitoa	5 273	350·0	360	13,010·4	673·70
Ka.ranga Lady ..	A. Lancaster, Palmerston North	5 7	350·0	365	9,821·5	664·99
Molina Shamrock ..	H. T. Mellow, Stratford	6 307	350·0	365	12,706·1	635·32
Shamrock Sweet Cherry	H. T. Mellow, Stratford	5 35	350·0	303	11,136·6	551·31
Ping Pong ..	J. A. Kurth and Son, New Plymouth	5 44	350·0	365	9,505·7	541·24
Little Jewel ..	R. R. Dean, Te Kumi	7 89	350·0	365	9,874·9	519·82
Oanga 2nd ..	W. H. Jakins, Christchurch	9 277	350·0	365	8,208·8	503·65
Della	J. Nicholson, Manakau	6 256	350·0	334	8,462·8	503·33
Willow Bank Ability	W. Johnson, Ngaere ..	5 18	350·0	316	9,220·2	467·98
Konini's Pet ..	R. S. Coplestone, Eltham	5 358	350·0	347	8,110·9	456·16
Benopi	A. Buchanan, Palmerston North	5 242	350·0	365	6,797·4	443·80
Fernaig Madge ..	G. H. Pearson, Taupaki	5 269	350·0	364	7,307·5	438·88
Golden Locks ..	J. Nicholson, Manakau	7 276	350·0	365	7,231·1	408·39
Dainty's Joan .	E. K. Clague, Manaia	5 23	350·0	309	7,344·9	394·25
	MILKING SHORTHORNS.					
Junior Four-year-old.						
Sweet Garnett 2nd of Cornwall Park	R. S. Allan, Hatuma	4 359	349·4	365	16,260·3	514·19
Mature.						
Honesty IV of Cornwall Park	R. S. Allan, Hatuma	6 6	350·0	365	13,957·2	502·05
	AYRSHIRES.					
Two-year-old.						
Maesgwyn Joy ..	C. Morgan Williams, Ohoka	2 194	259·9	365	12,056·2	478·62
Maesgwyn Starlight	C. Morgan Williams, Ohoka	2 337	274·2	365	10,132·4	410·20

Second-class Certificate.

	FRIESIAN.					
Junior Two-year-old.						
Rosevale Model Keyes	North and Sons, Omimi	2 89	249·4	365	14,515·4	572·64

African Redwing Partridges.—The opinion of the Board of Agriculture was asked recently as to whether any objection would be raised to the introduction of the African redwing partridge into New Zealand. The Board agreed that there was no likelihood of this bird becoming a nuisance to agriculturists, and decided to offer no objection to such introduction.

SEASONAL NOTES.

THE FARM.

SOWING OF GREEN FORAGE CROPS.

In nearly all parts of the Dominion November is the principal month for the sowing of summer and autumn green forage crops, both for the supplementary feeding of dairy cows and the fattening of sheep and lambs.

For rape, if the land is dirty, it is good practice to sow in drills 21 in. to 28 in. apart and intercultivate. By this method the land is well cleaned, and heavy crops of good feeding-quality may be obtained. Seeding will range from 2 lb. to 3 lb. per acre, with from 2 cwt. to 3 cwt. of fertilizer. Generally freezing-works mixtures are considered very suitable for rape, and they give big yields, but in moist seasons rather much leaf is produced and the crop does not ripen as quickly as desirable, the nitrogen content doubtless accounting largely for this. Many farmers complain that they get heavy crops but very poor fattening results. Practice goes to show that a pure phosphatic manure such as super and Ephos, super and Nauru, or basic super, while not growing such a leafy crop as a mixture containing nitrogen, produces a much better fattening-crop. The heavy leafy crop is all right for dairy cows, but the shorter, firmer one is better for lambs.

For cow-feeding Buda kale is preferable to rape. It is not so heating, and the subsequent growths are quicker. The same rate of seeding and manure recommended for rape will do for the Buda kale. Thousand-headed kale also has many good qualities as a forage crop.

In many districts, notably in Otago and Southland, chou moellier has proved an admirable crop for dairy cattle and sheep. It does not bloat cattle nor impart taints to milk. Further, although a member of the Brassica family, it is not affected by club-root to the same degree as turnips, a point much in its favour. Sown at the beginning of November this crop under usual conditions will be available for feeding off during February. It should be sown in 28 in. drills by the turnip-machine, at the rate of 1 lb. of good germinating seed per acre. Thinning has to be resorted to in order to give the plants plenty of room for development, and a distance of at least 14 in. between the plants should be allowed. The use of a mixture of 1 cwt. superphosphate and 1 cwt. finely ground rock phosphate should give good results. Intercultivation between the rows is necessary to obtain freedom from weeds.

Field-cabbages, especially of the Drumhead variety, are well worthy of trial for autumn and winter feeding. Excellent results have been obtained from them in the South. On club-rooted ground this crop would prove very susceptible to the disease, and consequently should not be sown in such land.

Maize may be sown when danger from frost is past. The Ninety-days variety is among the best for green feeding, sown at from 1½ to 2 bushels per acre. Suitable manures are those recommended for rape, at the rate of 3 cwt. per acre. Seed should be buried at least 1½ in., and guarded so far as possible against birds.

Japanese millet is a good fodder crop for cows and sheep, and should be given a trial in districts where rape does not do well. It requires a sheltered position to give good returns, and should not be sown too early—any time after the middle of November in the warmer districts, and the first week in December in colder situations. Sow through every coulter of the drill 16 lb. to 20 lb. of seed, and manure with superphosphate at 2 cwt. to 3 cwt. per acre. To get the best from millet feeding should start when the growth is 6 in. to 9 in. high, and the crop should be fed off in breaks. Treated thus it will give a number of feedings.

In tests of millet against rape for lamb-fattening the former has shown up very well, in several cases lambs having shown a bigger gain per head on the millet (see special article elsewhere in this issue). On the other hand, a good crop of rape will in a good season fatten more lambs per acre than the same area of millet. If not ready to start feeding millet when a few inches high it may be allowed to grow up to 18 in. or more and then be fed. So long as it is not allowed

to seed it will make a second growth. Where there is doubt about the rape crop it is good practice to drill 1½ lb. rape and 12 lb. of millet per acre. If both come away well there is a good mixed crop of splendid feeding-value, and if the rape fails the millet will give good forage. If a millet crop is not required for grazing it may be cut for hay or ensilage.

Peas for sheep-feeding may still be sown on the heavier land. Good varieties are Grey Partridge or Blue Imperial, sown at the rate of 3 bushels per acre. Superphosphate or basic super is a suitable manure for late-sown crops.

TURNIPS AND CARROTS.

Sowing of turnips will be one of the chief field operations in November, especially in the mixed-farming districts of the South, and attention should be paid to securing the best of seed. On club-rooted country an endeavour must be made to grow turnips only on land free from this disease. In order to get the crop well away out of reach of the fly it is important to work to a fine seed-bed and use a good dressing of quick-acting manure, such as a mixture of basic super and blood-and-bone. For early use Mammoth Purple-top is a good variety of soft turnip, but where the crop is to stand any length of time Green Globe and Red Paragon are better. The Green Globe variety keeps better than the Red Paragon.

Where turnip-growing is practically out of the question the growing of carrots should be considered. White Belgian, Matchless White, and Sinclair Champion are varieties worthy of trial, and should be sown at the rate of from 1 lb. to 2 lb. of dressed seed per acre. The ordinary method is to sow in drills 14 in. to 28 in. apart. For milking-cows the carrot may be considered superior to any other root crop.

In connection with root-growing, there is now on the market a one-horse single-disk ridger well adapted to the requirements of the average dairy-farmer who crops to a limited extent only.

LUCERNE.

Usually the weather in November (in the North Island at least) is not suitable for making hay, and the better proposition is to put the first cut of lucerne into ensilage, or feed it out green to cows and pigs. Lucerne cut towards the end of November should be ready to cut again early in the New Year, when it may be harvested for hay or fed out green. Lucerne is required at different times and for different purposes to suit varying conditions of farm and situation, and a great deal can be done to regulate this by means of the spring cuttings. Although it is recognized that there is a proper time for cutting lucerne—just when the new growth is coming away—it will not impair the stand if cutting is delayed for a time; in fact, the subsequent growths will often be more vigorous.

Areas that are being prepared for sowing in lucerne this year should have frequent cultivation to germinate and destroy weeds. In the drier and warmer districts November is a favourable month, but in exposed or cold situations sowing is better delayed until December. If the land has not been limed and carbonate of lime (crushed limestone) is to be used it should be applied at once. Burnt lime is best applied just before the seed is sown. Give at least 10 cwt. of carbonate or 5 cwt. of burnt lime per acre. Seed at the rate of 15 lb. per acre, and sow through every coulter of the drill, or, what is better, drill half the seed one way then cross-drill the remainder. The next best method of sowing is broadcasting after the Cambridge roller. The seed-bed should be well rolled and firm. Inoculated soil is usually necessary, a suitable quantity being about 3 cwt. per acre. Alternatively, the seed may be dressed with Farmogerm. Superphosphate or basic slag are the most suitable manures, but any phosphatic manure will give good results if applied at from 2 cwt. to 3 cwt. per acre. The requirements for obtaining a good stand of lucerne are clean land, fertile soil, a firm seed-bed, and favourable weather to germinate the seed. The Marlborough strain of seed is to be recommended.

PLOUGHING AND FALLOWING OPERATIONS.

Under Canterbury and North Otago conditions any land intended for summer fallow should be skim-ploughed as soon as possible. Rape and turnip land after green feed should be ploughed and worked down. Towards the end of November twitch-infested land should be ploughed to a depth that will just go beneath the twitch layer (probably about 4 in.), and when this furrow has dried out considerably the land should be cross-ploughed to the same depth. In this way large rough

hunks are left to dry out in the north-west winds, and most of the twitch will be destroyed. This method is preferable to skim-ploughing and grubbing, as the latter method consolidates the ground beneath the surface, and any piece of twitch that may have been missed will re-establish.

PASTURE-MANAGEMENT.

Pastures will now require the greatest care in grazing, so that the luxuriant early-summer growth is not allowed to become rank and unpalatable through insufficient stocking. The advantages of good subdivision of the land into comparatively small areas is well demonstrated by the finer sward and more succulent growth of those paddocks, which can be fed down quickly whenever necessary. Should the feed show signs of getting ahead of the stock it is a good plan to shut up one or more paddocks and cut them for ensilage. This can be done even in showery weather, and will not only save waste, but will greatly improve the succeeding herbage. Stock of all kinds relish a change on to fresh young grass.

The management of pastures is a phase of farming which perhaps requires special attention in Canterbury. Owing to the heavy local north-westers and moisture conditions generally, combined with heavy stocking during the spring months, pastures usually present a poor appearance about January, and even on the better land do not hold so long as they should. Spelling of grasslands should be practised to a greater extent—firstly with the object of allowing the better grasses to reseed, and thus re-establish the pasture; and, secondly, because a certain amount of feed, though somewhat dry, will be preserved for use later in the season.

—*Fields Division.*

BRANDING OF SHEEP.

Immediately after shearing all sheep should be carefully branded with the registered brand of the owner—that is, in all districts which are not exempt from wool-branding. It is noticed that a number of owners brand in a very careless manner, the oil or paint used not being of the proper consistency and simply making a blotch. Section 62 of the Stock Act states that all sheep shall be distinctly and legibly branded with the owner's registered brand, and for every such sheep not so branded the owner shall be liable to a fine not exceeding 10s.

In the case of stragglers or sheep shorn by mistake, these should be branded on the head with the registered brand of the owners in whose shed the sheep have been shorn, or, if he has no registered wool-brand, with a distinguishing mark of paint or tar. Failure to observe these rules is often the cause of bad feeling between neighbouring owners, and sometimes ends in Court proceedings.

All lambs should be branded not later than 30th April in each year.

—*Live-stock Division.*

THE ORCHARD.

FRUIT-TREES of various descriptions will now be in the summer stages, with young fruits and heavy growth of foliage. The fruits advance very rapidly in size, necessitating repeated sprayings to keep them protected against attacks from insect pests and the multitude of fungus spores. The same applies to foliage, which is of quite as much importance to the welfare of the tree as the production of fruit is to the grower. Every effort should be made to keep the foliage as healthy as possible. Unless the fruit and foliage are kept well covered disease-prevention is almost impossible, yet this must be done in such a way as to eliminate russet, burning, or other damage to either fruit or foliage.

SPRAYS AND SPRAYING.

Arsenate of Lead is used for the control of biting and chewing insects such as codlin-moth, leaf-roller, cut-worms, &c., and is used at the rate of 2 lb. (if in powder form) or 3 lb. (if paste) to 100 gallons water. To ensure the best results being obtained it is essential that all parts be thoroughly covered with the spray. With the rapid new season's growth this means repeated applications of not longer than twenty-one-day intervals.

Bordeaux Mixture (3–4 40) is used for the prevention and control of fungus diseases. As a summer spray for fruit-trees bordeaux should be used with the utmost caution, owing to the liability of damage to fruit and foliage. Never in any circumstances should it be used unless tested and proved to be alkaline. It is not really necessary on apple and pear trees except for black-spot control, and should be used only when spot is either feared or present. Before application arsenate of lead may be added to bordeaux.

Lime-sulphur is used for the prevention and control of fungus diseases, young scale, mites, &c. There are many forms of this solution, from home-made to the many brands of commercial manufacture. The solution varies in density according to manufacture, and should be tested for specific gravity in order to permit correct dilution. Recommended dilutions are always based on 33° Beaume. Whatever brand is used purity should be the main consideration first and every time, and concentration only a guide to dilution. A false concentration test can easily be established by adulteration with salt or sugar, both of which cause damage to the trees and crop. Use at a dilution of 1 gallon to 100 gallons water for pip-fruits, or 1–125 for stone-fruits, and apply sufficiently often to keep the growth covered. Lime-sulphur may be used in combination with arsenate of lead, but when so mixed a free acid is formed which must be neutralized by the addition of lime, or burning of foliage will take place; 3 lb. of lime per 100 gallons will suffice.

Atomic Sulphur is used in particular for the control of powdery mildew, but is a very useful supplement to lime-sulphur for the control of brown-rot, and tends towards improving the texture of the foliage. When used alone 10 lb. per 100 gallons is correct; when in conjunction with lime-sulphur 4 lb. to 6 lb. per 100 gallons. It may be applied with arsenate of lead and lime-sulphur plus lime.

Nicotine (40-per-cent. extract) is used for the destruction of aphis, leaf-hopper, &c., applied at the rate of 1 pint per 100 gallons. It may be mixed with arsenate of lead, lime-sulphur, and atomic sulphur, or the whole combined plus lime. If used as a single spray a spreading-medium is required, such as soap, 3 lb. per 100 gallons.

The present seasonal uses of the sprays would be as follows:—

Pip-fruits—Arsenate of lead, 2 lb. powder to 100 gallons; lime-sulphur, 1 gallon to 100 gallons; plus lime, if mixed, 3 lb. to 100 gallons (all three every 21 days); plus atomic sulphur, 4 lb. to 100 gallons, if variety is subject to mildew; plus nicotine, 1 pint to 100 gallons, if hopper or mealy bug are present. Bordeaux 3–4–40, alone or in combination with arsenate of lead.

Stone-fruits—Lime-sulphur, 1 gallon to 125 gallons water; plus atomic sulphur, 6 lb. to 125 gallons water (one application of each during November); plus nicotine, 1 pint to 125 gallons water, if aphis is present.

CULTIVATION.

Cultivation of the land should be continued. Where the land is heavy for the cultivator a very shallow ploughing may be done, but the land should not be left rough any longer than necessary.

THINNING.

Now that crops can be estimated, thinning may be done. Even where the crop is light it pays to remove all fruit from one- and two-year-old leaders in the interests of growth, and to reduce the number of fruits per cluster in the interests of thorough spraying and cleanliness of fruit. With a medium to heavy crop thinning pays every time. This practice is recognized by the successful orchardist as most necessary. Thinning allows all misshapen, underdeveloped, diseased, or injured fruit to be removed, regulates the crop from year to year, reduces to a minimum the production of culls and minimum-sized fruits, permits better colour, ensures more freedom from blemish, and does not overtax the tree or land.

No hard-and-fast rule can be laid down as to the number of fruits allowed to remain on the tree; all is governed by the circumstances of tree condition, land, &c. As a general rule, all fruits should be removed from one- and two-year-old leader wood, all clusters reduced to singles, or at most doubles, and fruits removed from the extremities of unstable lateral wood.

—W. H. Rice, Orchard Instructor, Hastings.

CITRUS FRUITS.

At this period citrus-trees should be showing considerable activity, especially those that have suffered in any way severely by frost damage; and as warm weather will have caused scale and other sucking insects to be on the move it is desirable that control measures be adopted at this juncture. For this purpose the prepared red oils are recommended as a spray, to be used at the rate of 1 part of oil to 40 of water. Owing to the difficulty at all times experienced in covering the under-part of the foliage of citrus-trees with spray material it will be found advantageous to adopt the use of a spray-gun for this work. The larger number of the young scale insects may generally be found on the under-side of the leaves alongside the leaf-rib, and these must be reached if effective control is to be obtained.

As citrus-trees that have been frosted come into activity growers will be enabled to see what portions of the damaged wood it is necessary to remove. Good clean cuts should be made when this work is undertaken, cutting to an outside shoot in each case.

Growers are advised to use those brands of red oil that have proved effective, rather than experiment with oils the qualities of which are, as yet, an unknown quantity.

STRAWBERRY-GROWING.

Fruit should be harvested immediately it ripens, not only to save depredations by birds, but also to prevent the taking of too much nourishment from the plant. Where necessary, spraying with Burgundy mixture for the control of leaf-spot may be continued, but it is not advisable to use this spray more often than is absolutely necessary. Watch for the appearance of runners, which should be pinched out during the fruiting season, before they grow too long and thus take nourishment from the plants.

Unfortunately, during the last few seasons a very unsatisfactory method of marketing strawberries has been adopted by quite a large number of the growers in the Auckland District—namely, the practice of "topping up" the chips with larger berries than those which are contained in the lower parts of the container. This is to be discouraged in any shape or form, and it is hard to realize how producers can be so blind to their own interests as to continue the practice, which must necessarily reflect back to them from the consumer.

FIREBLIGHT.

Any infection from this disease should be showing up at this time, and it is necessary that the very keenest lookout should be maintained, so that the diseased parts may be detected and immediately removed and burnt as already directed in previous notes.

—J. W. Collard, Orchard Instructor, Auckland.

POULTRY-KEEPING.

THE EXPORTATION OF EGGS.

With the object of ascertaining whether a payable outside market exists for New Zealand eggs when there is an excess over local requirements, the New Zealand Poultry Association arranged for two trial shipments of eggs to be sent to the London markets this season. The first consignment was shipped by the s.s. "Corinthic," which left the Dominion on 20th September. This comprised 1,580 cases of fresh eggs of thirty dozen each, six cases of preserved eggs, and about 2 tons of egg-pulp. The s.s. "Rotorua" left with the second shipment of about 2,000 cases on the 13th of this month. These shipments have been made up by various egg societies at Auckland, Wellington, Christchurch, and Dunedin. The South Island quota will be disposed of under the supervision of Mr. J. B. Merrett, late secretary of the New Zealand Poultry Association, who accompanied the first shipment. The North Island quota has been consigned to reliable agents for disposal.

The eggs are packed in standard white-pine cases, with special cardboard fillers and flats. Woodwool pads are also used, one being placed on top, bottom, and centre respectively of each case; these act as cushions to prevent jarring

and breakages. The case is made in such a way that there is free circulation of air through it at all times. The eggs are carried in a special chamber at a temperature of about 34° F.

It was realized that if these eggs were to hold their own against other competing countries a high standard of quality was the first essential. There being no regulations to enforce compulsory grading, an arrangement was made between the Department of Agriculture and the Poultry Association whereby the whole of the grading, testing, packing, &c., was carried out under the supervision of the Department's Poultry Instructors. As the eggs came from the producer they were first unpacked and graded. All eggs found to be under 2 oz. in weight, or with dirty shells or of bad shape, were rejected. The good eggs were then passed on for testing. The testing is carried out by placing the egg before a strong electric light, which is contained in a small box. In the latter there are two apertures barely the size of an ordinary egg. The operator takes an egg in each hand and places them before these apertures. By this means the internal quality can be at once detected. All eggs with large air-cells (indicating staleness) are rejected, while addled eggs or those containing pale yolks or blood spots are also discarded.

By this examination it was ensured that the eggs contained in these trial shipments were of excellent quality, good size, and clean and inviting in appearance. In addition they were carefully packed, while the case itself bore a well-got-up, attractive appearance. The loading on board ship was carried out in a most careful manner by those in charge of the work. Therefore, if the eggs retain their good qualities during transit in the cool chamber, there should be everything in favour of their opening up at their destination in a satisfactory condition.

The next question, and one which is of the greatest importance, is whether or not the experiment will prove a financial success. Information bearing on this matter will be anxiously awaited by poultrymen generally.

It is pleasing to note that the egg-circle agents and others who were entrusted with the arrangements for the shipments on behalf of producers at the four centres did everything possible to help myself and assistants in having the work of grading, &c., carried out to a high standard. One of the worst features in connection with the work was the large number of inferior-quality eggs sent by producers to the collecting-depots. With a view to eliminating weaknesses likely to crop up in this respect, the Department recently issued a bulletin (reprinted from the *Journal* of July last) setting forth in a clear manner the class of eggs required for export and those that were unsuitable. This bulletin was distributed gratis to producers, but, judging by the very large number of poor eggs sent forward to some depots, it is questionable if many even took the trouble to read it. Unfortunately, the trouble was not confined to a few producers, but to all but a small minority. Some shocking examples of how not to market eggs were observed when sorting out the various lines. For days it was not uncommon to see from 50 to 70 per cent. of the eggs that came forward rejected, chiefly because they were undersized, stale, or in a dirty condition. It must be admitted that few overripe eggs were sent in, so that the great bulk of the rejected eggs were quite fit for human consumption. Some allowance might be made for a few small eggs finding their way to the collecting-depots, but there is no reason whatever, except carelessness on the part of the producer, for the large number of dirty-shelled eggs that came to hand. Thousands of eggs of the desired size, and wholesome in every other respect, had to be rejected for no other cause. Yet it is safe to say that, with few exceptions, they were deposited by the hen in a clean, fresh condition. Of course, all poultrymen were not alike in this respect so far as the export eggs were concerned, for at each centre lines of eggs were to be seen which were a credit to the producer. It was a pleasure to handle such eggs. Indeed, some lines were so good that with the exception of an odd egg containing a blood spot or a crack (which was no fault of the producer) the whole of the eggs in the line were ready for packing in the export cases. This is how it should be.

Another unsatisfactory feature of the whole business is that the cost of handling, such as unpacking, testing, grading, &c., must be borne by the smaller margin of eggs passed for export. Mistakes—indeed, costly mistakes—have been made which cannot be rectified now, and care should be taken that these are not repeated. If one man can send forward his eggs in a well-graded, clean condition, then surely others can do likewise. If further shipments are to be made, each producer must be made to realize his responsibility. Above all, he should be made to understand that the work of removing dirt from his eggs should be done at home

and not at a grading-depot. Some breeders even went so far as to send in eggs that had failed to hatch in an incubator.

During the process of grading, testing, &c., many persons visited the depots and took a keen interest in the work. Unfortunately, however, the work was not witnessed by many of those requiring the lesson most—the producing community. Had the various poultry organizations arranged gatherings of producers it would have no doubt served a most useful purpose by letting the careless poultryman judge for himself his own methods of marketing as compared with the methods of those who market their produce in a proper manner. Many breeders are pinning their faith to an export trade as a means of relieving the summer surplus, and rightly so, but it should be remembered that the critical oversea markets will not pay full rates for undersized and inferior-quality eggs. Only the best will warrant the export business. Especially is it necessary to remember quality in initiating a trade.

Another point that should be borne in mind is that the freight of eggs is based on space measurement, which the producer must in the long-run pay. The export case and fillers are made to hold thirty dozen 2 oz. eggs or slightly over. It is therefore poor business to send undersized eggs abroad, in view of the fact that the larger product is of much greater value. Particularly is this so in these days of high freight charges.

ACTION BY THE EGG-LAYING COMPETITION EXECUTIVES.

The egg-laying competitions have rendered the industry excellent service in developing the laying-power of certain breeds of poultry, but those who control them have realized that the number of eggs produced should not be the only object. It is now recognized that the weight of eggs laid by the respective pens in the competitions is of equal or greater importance than numbers. It is interesting to know the weight of eggs produced by competing pens. These figures disclose valuable data, clearly indicating specialists' stock that fail to lay the required weight of egg. The management of the different competitions are to be congratulated on not allowing prizes to be won by birds laying a second-grade product, and it is only by this means that the egg standard will be raised throughout the Dominion. The eggs sent from the laying competitions to the export depots were a picture to look at, being of good size, clean, and fresh.

THE LOCAL EGG-MARKET.

The unsatisfactory manner in which so many producers sent in their eggs for export (not only the small producers, but big ones as well, the latter in many cases being the worst offenders) obviously points to a weakness in the system under which the local trade is catered for. It was sufficient, indeed, to indicate that the marketing of eggs calls for urgent reform from one end of the Dominion to the other. Under the present crude pooling-system by which eggs are generally marketed there is no encouragement to the producer to go to any special trouble in breeding birds to lay good-sized eggs, or to market them in the best possible condition, simply because these supplies of a high-grade quality article have to be sold at the value of the unsatisfactory lines. Usually it is the eggs of the latter class coming on the market which set a low value for eggs in general. Obviously the consumer will not be keen for them, so the price has to be reduced, perhaps a second and third time, till the rate is so tempting that sales are effected.

One of the best means of encouraging a greater local consumption of eggs will be by the institution of a system of grading and testing every egg before it reaches the consumer, as has been done in the case of eggs for export. If the various egg-circles operating in the Dominion are really anxious to build up a high-class local trade, which would be of real benefit to both the consumer and producer, they must have regard to this feature. The day is passing when the consumer will purchase eggs irrespective of quality. He will rightly demand that they be fresh, clean, and of a certain weight. The necessity, therefore, of defining a first- and second-grade egg for the local market becomes a matter of prime importance.

It is gratifying to note that at least some of the Wellington grocers have adopted the principle of selling eggs according to their weight. They are sold by count as formerly, but they are graded to size. This ensures that each grade is of about the same relative value so far as weight is concerned. This is how

it should be. Under the present general system of disposal by the dozen quite irrespective of their weight the purchaser must frequently, if not always, pay too much for small eggs and too little for large ones. For example, it is common to see lines of eggs in shop-windows ranging from 1½ oz. to 1¾ oz. and ticketed up at, say, 2s. a dozen, whereas probably in the next shop 2 oz. eggs and over may be seen marked up at exactly the same figure. Recently a poultry-keeper brought to the writer a line of eggs which scaled 30 oz. to the dozen, or 2½ oz. each. He declared that in a wholesale way he got no more for this class of egg than the average line of 1¾ oz.

It has been decided that no egg under 2 oz. in weight can be considered as a first-grade exportable article, and here the question arises, Why should there be one grade for export and another for local consumption? If it is necessary to specially define what a first-grade egg should be in order to work up a successful oversea trade, then surely it is of equal importance to do likewise for the local market. The local consuming public is prepared to pay a good price for a good quantity and quality egg, but they cannot be expected to pay top prices for eggs of doubtful quality. It is only when the central egg-collecting depots resort to the grading and testing of eggs, as is being done for export, that the local market will be placed on a sound footing. It is at these places that, after being tested and graded, the eggs should be stamped according to their grade and guarantee of quality. Under the present general system of organized control the producer applies the brand of the circle and his individual number, but this is next to useless as a guarantee of quality, as in too many cases the eggs are placed in the carriers just as they come from the nest, without regard to cleanliness or distinction as to size and colour. It would be interesting if some cases of eggs as packed for export were displayed in one of the shop-windows of a leading grocer and offered for sale for preserving purposes. It is safe to say that such guaranteed quality would easily realize from 2d. to 3d. a dozen over ordinary market rates.

It is to be hoped that at the next conference of the New Zealand Poultry Association steps will be taken to place the marketing of eggs on a more satisfactory footing. The egg-laying competitions are making a special effort by means of weight clauses to increase the size of eggs produced in these tests. It now rests with the egg-circle movement to take up the matter in a similar manner by defining what a first-grade egg really is, and seeing that the market rate is based on this and not on the doubtful article.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

FEEDING AS A SAFEGUARD.

In many districts there is a distinct break in the honey-flow from the cessation of the willow and fruit bloom until the clover makes its appearance. It is during this period that the bees must be carefully watched, not only to see that they are not dying of starvation, but also to provide for a sufficient increase in young bees which will develop into field workers by the time the main honey-flow arrives. Gently stimulative feeding is the best course to adopt at this period. The quantity of syrup fed will depend largely upon the strength of the hives. If feeding has to be resorted to the sugar-syrup may be fed in a less concentrated form than that which is given in the autumn and spring months, the quantity of water being increased. A syrup fed in the proportion of one of sugar to six of water is all that is required, and will be the means of keeping the colonies strong in brood and bees. The invariable rule should be observed always to feed in the evening and inside the hive.

VENTILATION.

No set time can be given for increasing the size of the entrances, but the action of the bees should be noted. If where the entrances to the hives were contracted in the autumn to prevent the intrusion of mice they have not been already widened, they should be attended to at once. Proper ventilation during the working season is an important item in bee-management, as it relieves large

numbers of workers from the duties of fanning during the hot weather. In extreme cases it may be necessary to elevate the hive-body by placing 1 in. blocks between it and the bottom-board. This should be sufficient to meet all requirements.

SUPERING.

Preparations should be well in hand for enlarging the hives. This may be done when the brood-chamber is getting full of bees, and the operation should be carried out in mild weather. Do not wait until the bees are cramped for room, but anticipate their wants and add supers when they are required. Where drawn-out combs are used no trouble will be experienced in inducing the bees to enter the supers. It often happens that no combs are available, in which case sheets of foundation must be used; but the bees will not always take readily to these unless there is a good flow of honey coming in, and a little encouragement will have to be given to induce them to enter the supers when only foundation is used. Should the bees fail to start work in the supers, elevate one or two frames of honey from the brood-chambers, at the same time inserting in their place sheets of foundation from the super. Do not bring excluders into use at this season, as the bees will rarely work foundation in the supers when they are used. Much time is lost by this practice, and very little honey will be gathered.

TREATMENT OF FOUL-BROOD.

As advised last month, beekeepers should not fail to treat all cases of foul-brood as soon as settled weather conditions prevail. Nothing is to be gained by postponing treatment, and the earlier the infected colonies are dealt with the more likelihood there is of their working up to strength for the main crop. Generally the weather is settled enough in the latter part of November for undertaking treatment in all parts of the Dominion, and usually the clover is yielding sufficiently to enable the beekeeper to carry out the work with a minimum amount of feeding.

At every inspection of the hives the condition of the brood should be noted. If any of the capped cells appear to be different from the rest an examination of the cells should be made to ascertain the cause. The cappings of healthy brood are bright, fresh, and convex in form, whereas those attacked by foul-brood are darker, flat, and easily distinguishable from healthy brood by their blackish-brown colour. In the early stages of the disease on opening the cells a gluelike coffee-coloured mass will be noticed, and on the insertion of a splinter of wood the rotten mass will rope out some little distance from the cell. This ropiness is a true test for foul-brood. In the more advanced stage the disease is not so readily detected, because the rotten mass has dried upon the bottom of the cell in the form of a black scale. Generally, Italian bees will open the cells more readily than Blacks and remove the cappings, rendering it much more difficult for the beginner to detect the disease; but even though the cappings have been entirely removed the scale is easily detected on the base of the cell by holding the comb so that the light will pass over the shoulder into the cell.

Other indications of the disease in the advanced form are ragged perforations and a characteristic bad odour which is emitted. When the odour can be detected on opening up the hive the latter should be destroyed at once, remembering that the treatment of such colonies is only a waste of time, and it is by far the best policy to use drastic measures. When the disease has reduced the condition of the colonies until there are only a few bees left it is useless and dangerous to undertake treatment, and much the safest plan is to destroy the hive and contents as it stands.

Many new systems of treatment have been put forward, but with little success, and the beginner would be wise to discard any but the McEvoy treatment, which has been successfully used the world over. If it is properly carried out failure to eradicate foul-brood is almost unknown. When treatment has to be undertaken it should be carried out, if possible, in the evening, when the bees are quiet, there being then less risk of spreading the infection to other clean hives in the apiary. In cases where the hives are close together it is safer to close the entrances of the immediately adjoining hives.

To carry out the treatment prepare a set of frames fitted with narrow strips of foundation, and put these into a clean hive. Shift the diseased hive to one side, and place the hive fitted with these "starters" in its place. Remove the combs one by one, and shake and brush the bees into the prepared hive. When

the bees are removed put the diseased combs into a spare super and cover immediately. Remove all parts of the infected hive and combs to a place of safety out of reach of the bees. In four days' time the operation of removing the "starters" must be undertaken, when in their place frames fitted with fresh sheets of foundation are substituted. Shake the bees off each of the starter frames, and insert the frames containing full sheets of foundation. The comb built from the starters must be cut out and melted up. The object of the treatment is to induce the bees to use up the infected honey taken from the old hive, so that when they are given the second shaking they start clean.

It may happen that the bees will swarm out when given the second shaking. To prevent this either cage the queen, or, better still, place a piece of queen-excluder in front of the entrances. This will prevent the queen from leaving, and all will be well.

A further examination should be carried out in three weeks' time to note the condition of the brood. If disease reappears after treatment do not start tinkering with the brood by cutting out isolated cells. This practice is dangerous, and although often advised is misleading. A much better plan is to remove the entire comb, or, better still, make use of a modified form of the McEvoy method. In place of shaking the bees on to strips of foundation starters for four days, the bees are shaken on to nine sheets of foundation and an empty bone-dry comb, this being inserted in the centre of the hive. At the end of twenty-four hours the comb can be removed and a frame containing a sheet of foundation put in its place. This operation should be performed quickly and quietly, with the use of very little smoke. The object of inserting the dry comb in the centre of the hive is to induce the bees to store the honey which they took from the diseased hive when shaken.

Treated colonies: If bad weather sets in a strict watch should be kept over treated colonies to prevent them from starving out. Feed sugar-syrup in the proportion of four of water to one of sugar. Feeding should be kept up until the bees are gathering nectar freely.

—E. A. Earp, Senior Apiary Instructor.

THE GARDEN.

VEGETABLE-CULTURE.

As the new season's vegetables and fruit come in the rhubarb and asparagus beds should be given a rest and allowed to complete their growth. It is often advisable to assist them now with a good dressing of suitable fertilizer.

Complete the sowing of hardy main crops—carrots, red and silver beet, &c.—and keep all seedlings well thinned and hoed.

The seeds of pumpkin, marrow, cucumber, and melons may be sown as soon as the danger of late frost is over. They prefer a warm, moist, well-drained locality. Plant 6 ft. to 10 ft. apart, about six to eight seeds in a clump, first making a slight depression. If, after planting, a sheet of glass is laid over clumps of the more tender kinds it assists germination and keeps away birds, which are often very troublesome.

In localities which are sufficiently warm the kumara (sweet potato) may now be planted out. Space the plants a little wider than the ordinary potato.

Winter crops, such as broccoli, savoy, cabbage, leeks, and celery, may be sown now for planting out early in the new year.

Maintain a supply of salads and spinach by repeated sowings at short intervals.

Tomatoes.

In most districts tomato-plants may be planted outside now. To get an early crop the plants must be strong, well rooted, and hardened off; avoid plants that are stunted and crowded in the boxes. While the ground should be well prepared, it must have settled down firm. The plant does best on rather a solid bed.

Under glass the first picking of fruit will probably be made this month. The ground should then be well mulched down, and occasional applications of liquid manure made. Keep the plants well secured to the strings and all laterals pinched out. Foliage may be trimmed from round the ripening bunch.

SMALL-FRUITS.

In many small-fruit sections the plants are stunted and poor; a great improvement would be shown if a dressing of the more soluble chemical fertilizers were given now. Usually this includes superphosphate, sulphate of ammonia, and sulphate of potash. The mixture should be broadcast between the rows and scarified in.

Cape gooseberries may be planted out now. Results will largely depend on the preparation given to the land. A good spacing is 3 ft. between the plants and 6 ft. between the rows.

THE FLOWER-GARDEN.

It is now time to plant out the half-hardy annuals, dahlia and chrysanthemum plants. The violet-beds will benefit and give a much better crop of blossom next season if a good dressing of chemical fertilizer is applied now. The foliage of many kinds of bulbous plants is inclined to be in the way and look untidy, but it should be carefully preserved. The plants are setting the flower-buds for next season, and should have every attention.

The proper use of chemical fertilizers is the secret of success in modern gardens. The soluble kinds make the feeding of plants with liquid manure an easy matter, but the application must be properly timed. For the different qualities and effects of the principal chemical fertilizers, see the article in the *Journal* for June last. An amount of 1 oz. to the square yard represents 3 cwt per acre.

Lawns and Lawn-mowers.

Grass lawns require regular trimming now to keep them in order. The work is often unsatisfactory owing to the mower being in bad order. It is either blunt or badly set. The principle on which the ordinary lawn-mower is made is that of a spindle of beaters revolving quickly on a fixed ground plate or knife. There are set-screws at each end of the spindle to enable one to adjust it to the fixed knife. The adjustment should be even, and sufficiently close to cut paper cleanly when placed between.

To sharpen the mower place it upside down on a bench and arrange the mechanism to enable the beaters to revolve the opposite way. By revolving the beaters in this way and wiping them occasionally with a mixture of emery-powder and oil they will quickly improve. Finish with knife-powder and oil to give a fine edge; then wipe them clean and reset the machine. Machines are made with facilities for sharpening them in this way.

—*William C. Hyde, Horticulture Division.*

CLASSIFICATION OF SOILS BY PLANT-FOOD PERCENTAGES.

THE following tables, representing European practice, will assist readers in interpreting chemical analyses of soils as given, for instance, in the article "Some Soils of Otago Peninsula" printed elsewhere in this issue.

Maercker's Rating (Hydrochloric-acid Extract).

Grade of Soil.	Total Phosphoric Acid.	Total Nitrogen.
Poor	.. Below 0·05	Below 0·05
Medium	.. 0·05–0·10	0·05–0·10
Normal	.. 0·10–0·15	0·10–0·15
Good	.. 0·15–0·25	0·15–0·25
Rich	.. Above 0·25	Above 0·25

Rating adopted for Available Plant-food (Citric-acid Extract), as determined by B. Dyer's Method.

Grade of Soil.	Potash.	Phosphoric Acid.
Deficient	.. Below 0·005	Below 0·01
Normal	.. 0·005–0·01	0·01–0·015
Good	.. Above 0·01	Above 0·015

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

FARMING-PRACTICE ON PUMICE LAND.

"SPARRING FOR KNOWLEDGE," Rotorua :—

Is it good farming-practice on pumice soil of superior quality to burn off the fern and scrub, plough, and leave in that condition without a crop for twelve months or more? Would it be better to plough tall fern under and leave it to decompose, also without seeding? Is the basic slag at present on the market as efficacious as superphosphate on a pumiceous soil? In the Taupo district turnips can be grown on virgin land on the first furrow, with little cultivation. Here, on a much better soil, this cannot be done without first growing clover. Why the anomaly? What manure would bring about that much-desired result?

The Fields Division :—

If the scrub you refer to is mainly light manuka you are advised to burn it with the fern and plough without delay as deeply as the soil will allow. Disk, harrow, and roll well, with a Cambridge roller if possible. Work up a good seed-bed and sow turnips. This crop can be put in about November or December. When fed off, work up the soil and put down grass about October. Tall fern can be treated similarly. If the scrub is chiefly heavy manuka it should be cut and later burnt. If this is done by February surface-sow with the following mixture: 3 lb. Italian rye-grass, 5 lb. perennial rye-grass, 4 lb. Yorkshire fog, 6 lb. Danthonia pilosa, 2 lb. Chewings fescue, 1 lb. brown-top, 2 lb. crested dogstail, 1 lb. white clover; total, 24 lb. per acre. After a number of years the area can be ploughed, worked down, and sown in permanent pasture.

If you require fertilizers for top-dressing pasture a mixture of equal parts of superphosphate and basic slag gives good results on pumice soils. For sowing down pasture 2 cwt. to 3 cwt. of super is to be recommended. This dressing will give better results if the land has been limed. The slag on the market made by the Bessemer process is to be recommended. If you lime the soil, using 5 cwt. to 15 cwt. of ground limestone per acre, and use a mixture consisting of a good line of bonedust and super at the rate of 2 cwt. to 3 cwt. per acre, you should get satisfactory results on the first furrow with turnips. One part of blood-and-bone to two of super should be used. It must be remembered that pumice soils generally are deficient in nitrogen. A crop like turnips, following clover, will derive benefit from the humus added by the clover crop, which, apart from other benefits, supplies nitrogen. When clover precedes turnips it must be expected that the latter crop will benefit by the residue from the clover.

CASTRATION OF CALVES.

"CARDUUS," Marton :—

Will you please inform me as to the best method of castrating bull calves, and the age at which it is done?

The Live-stock Division :—

Bull calves are generally castrated as soon as the testicles can be found in the scrotum, or purse. The method of castration is as follows: The calf is turned up in a sitting position and held there by an assistant. The operator then pulls the testicles down until the skin over them is stretched tightly. An incision is made at the lower end of the purse, over one testicle, which is then forced through the wound. The blood-vessels and the cord are then severed by scraping with the blunt part of the knife while still being stretched. This scraping prevents much bleeding. The second testicle is then removed in the same way, and a little carbolized oil applied to the wound, when the calf may be released.

PROPORTION OF CREAM TO MILK.

M. O'Connor, Timaru :—

Please advise me what weight of cream should come off a gallon of milk with a 4 per-cent. test, the test of the cream being 40 per cent.

The Dairy Division :—

Assuming that the milk is of average specific gravity, 1 gallon would weigh 10·3 lb. This gallon of milk, containing 4 per cent. of butterfat, would yield 1 lb. of cream containing 40 per cent. butterfat. This means that the fat lost in the skim-milk is equivalent under general conditions to that contained in the 0·3 lb. of milk.

DOG WITH SORE FEET.

B. B., Kai Iwi :—

I have a dog suffering from swollen and inflamed feet. If it is allowed off the chain the feet soon become quite raw. All four feet are affected. I have tried applications of tar and lard, and have kept the dog inside a shed, but there has been no improvement. Could you suggest any treatment ?

The Live-stock Division :—

Apart from many possible accidents, pricks, wounds, &c., the feet of dogs are liable to become sore after a long day's work ; the pads become worn, and the sensitive structures become hot and painful. For this, rest on clean bedding and bathing are essential. Hot boracic packs are useful. After bathing, the feet may be soaked in a mild alum bath, or, better still, painted with a little compound tincture of myrrh. Do not put the dog to work again till the feet have quite recovered.

APPLE POLLINATION.

A. L. Frost, Huapai :—

I would feel obliged if you would kindly let me know the best apple for pollinating trees of the McLiver's Winesap variety.

The Horticulture Division :—

Accepting the theory that any variety flowering at the same time will be an effective pollinator, any of the following varieties should answer : Salome, Delicious, Dougherty, Gravenstein, Dunn's. Dunn's is placed last in the list because it is inclined to be an alternate-year bearer, consequently there may be years when it will have no blossoms.

DEHORNING YOUNG CATTLE.

"Onetoko," Tokomaru Bay :—

In regard to the dehorning of cattle, I understand that the use of caustic potash for treating calves is recommended. This, however, owing to the extreme care necessary in its application, is not always successful where one handles big herds on stations, as the calves have to be done at a certain age, which is not practicable. I fancy the best age is from fourteen to fifteen months—say, in October—using a dehorning-machine and applying Stockholm tar and kerosene, and taking a rim of hair off with the horn. I should be glad to have your advice in the matter.

The Live-stock Division :—

The time you state for dehorning the young beasts would be quite suitable. If using a dehorning-machine see that it is in first-class order before commencing. Use Stockholm tar as a dressing afterwards.

WEATHER RECORDS: SEPTEMBER, 1923.

Dominion Meteorological Office.

GENERAL SUMMARY.

THE month of September opened with strong south-west winds and cold and showery conditions, but was quickly followed by fair weather, and anticyclonic pressure held sway until the 9th, when northerly gales brought heavy rain, particularly in the northern districts. A westerly low-pressure then spread over the country, and, although during the last week of the month another anticyclone was located over the North Island, the barometer continued low in the South until the close. Two distinct westerly disturbances passed in the South, their troughs culminating on the 17th and 23rd. A cyclonic disturbance passed by the East Cape on the 18th, and was followed by another on the 20th.

The total rainfalls of the month were heavy northward of East Cape and Kawhia, and above the average in the Blenheim and Nelson districts, as well as at Greymouth, Hokitika, and Arthur's Pass; but elsewhere the totals were generally below the average of former years. There were some rather severe thunderstorms with hail in the North Island on the 23rd and 24th.

The weather may, on the whole, be described as dry, warm, and pleasant, and favourable to the rapid growth of grass and early-sown crops.

RAINFALL FOR SEPTEMBER, 1923, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average September Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	9·87	13	3·19	4·75
Russell	4·84	13	1·94	3·42
Whangarei	3·32	17	1·00	4·88
Auckland	4·00	22	1·24	3·63
Hamilton	3·86	21	0·96	4·37
Kawhia	3·70	17	0·54	4·39
New Plymouth	4·12	16	0·93	5·08
Inglewood	7·58	15	1·61	9·73
Whangamomona	4·68	19	1·28	7·57
Tairua, Thames	4·82	9	2·06	4·64
Tauranga	9·29	18	2·98	4·33
Maraehako Station, Opotiki	6·34	15	2·22	4·28
Gisborne	3·04	8	1·48	3·11
Taupo	5·82	14	2·16	3·71
Napier	..	..	..	2·29
Maraekakaho Station, Hastings	1·72	12	0·42	2·66
Taihape	1·70	14	0·40	3·72
Masterton	1·42	11	0·38	3·18
Patea	1·97	11	0·53	3·63
Wanganui	1·94	7	0·57	3·05
Foxton	2·27	10	0·83	2·38
Wellington	2·20	10	0·59	4·10
South Island.				
Westport	5·67	18	1·00	6·82
Greymouth	9·29	16	1·83	8·26
Hokitika	11·51	17	1·93	9·23
Arthur's Pass	15·17	11	4·10	14·96
Okuru, Westland	9·86	15	1·48	12·48
Collingwood	8·76	9	2·97	10·13
Nelson	4·53	10	1·76	3·75

RAINFALL FOR SEPTEMBER, 1923—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average September Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Spring Creek, Blenheim	2·95	9	0·90	2·64
Tophouse	4·61	15	1·25	4·81
Hanmer Springs	0·40	4	0·20	4·58
Highfield, Waiau	0·45	3	0·27	3·65
Gore Bay	0·94	6	0·39	4·28
Christchurch	1·42	8	0·49	1·75
Timaru	1·20	7	0·38	2·18
Lambrook Station, Fairlie	0·75	5	0·56	2·30
Benmore Station, Omarama	1·56	8	0·35	2·14
Oamaru	1·44	8	0·68	1·74
Queenstown	0·54	5	0·15	2·52
Clyde	0·25	6	0·10	1·06
Dunedin	2·07	11	0·80	2·75
Gore	..	..	..	2·44
Invercargill	1·78	15	0·36	3·03

DOMINION CROP STATISTICS: SEASON 1922-23.

Crop.	Area.	Yield per Acre.	Total Yield.
Wheat—	Acres.		
For threshing	275,775	30·44 bushels	8,395,023 bushels.
For chaff, hay, or ensilage	1,181	1·46 tons	1,724 tons.
Not harvested (fed off, &c.)	1,731	..	..
Oats—			
For threshing	143,090	39·75 bushels	5,688,157 bushels.
For chaff, hay, or ensilage	302,216	1·59 tons	480,147 tons.
Not harvested (fed off, &c.)	23,622	..	..
Barley—			
For threshing	17,473	34·23 bushels	598,040 bushels.
For chaff, hay, or ensilage	428	2·11 tons	901 tons.
Maize—			
For threshing	9,732	51·97 bushels	505,776 bushels.
For ensilage	739	5·73 tons	4,231 tons.
Peas and beans—For threshing	24,449	28·53 bushels	697,548 bushels.
Linseed—For threshing	10,649	0·48 tons	5,133 tons.
Rye-grass	34,850	391·22 lb.	13,634,187 lb.
Cocksfoot	13,431	146·76 lb.	1,971,135 lb.
Chewings fescue	10,305	225·22 lb.	2,334,386 lb.
Crested dogstail	9,423	196·11 lb.	1,259,613 lb.
Red clover and cow-grass	13,494	190·50 lb.	2,570,650 lb.
White clover	5,520	157·45 lb.	870,087 lb.
Other grasses and clovers	2,938	222·58 lb.	587,159 lb.
Grasses and clovers for hay, &c.	175,558	1·80 tons	316,573 tons.
Potatoes	20,197	5·64 tons	113,825 tons.
Green fodder	249,417	..	..
Turnips	498,974	..	..
Mangolds	9,694	..	..
Onions	497	9·16 tons	4,553 tons.

CORRESPONDENCE.

NESTING OF THE YELLOW-BREASTED TIT.

MR. EDGAR F. STEAD, of "Ilam," Riccarton, Christchurch, writes to the Editor:—

"I have read with interest the articles on 'The Relation of Birds to Agriculture in New Zealand' which have appeared in your *Journal* recently. Dealing with the yellow-breasted tit (*Myiomoira macrocephala*) the writers say that they know of no recent cases of this bird's nest having been built in orchards or gardens. With no desire to criticize the articles in question I would yet like to give my experience in so far as Canterbury is concerned.

"The 'tomtit' is one of the native birds that has undoubtedly increased here in the last ten years. As there is very little bush left in Canterbury, excepting on the hills, the tomtits, during the winter, frequent the large plantations and areas of scrub (mostly gorse, broom, lupin, &c.) on river-beds, and remain to breed. For the last four years they have come to my garden in the autumn, and on three occasions have bred here. Two years ago I decided to tame a pair which were here, and by collecting all the grass-grubs which the gardeners dug up, and feeding the tomtits with them, I at last got the birds to come freely to my hand for their food. They nested in the ivy which covers a eucalyptus in front of my house, but when the young were half-fledged a cat got the hen bird. (This, I may say, was the only cat I had ever willingly allowed to live here, and it is gone now.) The cock bird, however, aided by myself, reared the two young, and, after feeding them for three days in the top of a cedar, took them away with him early in November. In April of the following year he returned, and fed from my hand as before. He got a mate, and the pair were extraordinarily tame, taking grubs from the hands of complete strangers. They left, however, in September, and I never saw them again.

"Last winter a pair came, and, aided by previous experience, I quickly had them tamed. I then got a piece of firewood and nailed it up in the corner of my veranda, making what I considered to be an ideal nesting-site for a tomtit. On 29th August the birds decided that it was an ideal site, and commenced to build there. The first egg was laid on 10th September, and at date of writing the hen is sitting. She takes no notice of people moving about, or of any noises, or of the hall light, which at night shines through a fanlight on to the wall close by her nest. The cock bird collects all the food, and feeds her off the nest, though she occasionally still comes to me for food. As the cock bird frequently comes to my hand for a grub when he already has got food in his bill, I have been able to get a good idea of their food. I have seen him with caterpillars (all sizes from small ones up to fat greenish ones 1½ in. long), flies (including houseflies), millipedes, cockroaches, and spiders. As the nesting-site is quite safe from rats, cats, or stoats, I have every hope that the birds will safely rear their brood.

"As I have said, I do not write this to criticize the articles, but rather to amplify them on this particular point, and in the hope that perhaps some others may take to taming tomtits in their gardens, or, at any rate, giving them all the protection that such a wholly delightful and useful little bird deserves."

Orchard Registration.—The number of orchards registered during the financial year 1922–23 was 7,044, representing a total of some 30,000 acres. The amount of £1,982 was collected in orchard-tax.

British Market for Peas and Beans.—The following information was cabled by the High Commissioner on 6th October: Peas—Partridge, quiet; Tasmanian ex store, 90s. to 100s. per quarter; New Zealand, 70s. to 82s. 6d. according to sample; English obtainable at from 55s. to 60s. New crop of New Zealand March/April shipment offered at 77s. 6d., but no business reported. Blue in poor demand; New Zealand afloat sold for £18 5s. per ton; forward shipments, £17 10s.; Tasmanian quoted at £20 to £21 ex store. Beans—English good quality selling at 43s. to 50s. per quarter ex store, but no inquiry for imported.

ANNUAL SHEEP RETURNS, 1923 (30TH APRIL).

TABLE I.—SUMMARY BY SHEEP DISTRICTS.

Class.	Auckland.	Napier-Gisborne.	Wellington-West Coast.	Marlborough-Nelson-Westland.	Canterbury-Kaikoura.	Otago (including Southland).	Total in Dominion.
Stud rams	538	926	3,243	580	3,586	1,989	10,862
Other rams	23,705	83,995	68,231	16,434	69,822	57,006	319,193
Wethers	209,827	486,322	562,336	204,711	483,795	664,636	2,551,627
Breeding-ewes	977,433	3,405,019	2,787,702	684,971	2,872,220	2,335,658	13,063,003
Dry ewes	51,566	230,667	172,954	46,132	152,562	164,951	817,932
Lambs	474,788	1,815,404	1,455,907	313,705	1,060,673	1,189,345	6,318,822
Totals, 1923	1,737,857	6,022,333	5,049,473	1,266,533	4,651,658	4,353,585	23,081,439
Totals, 1922	1,705,155	5,625,001	4,765,649	1,344,444	4,584,841	4,197,169	22,222,259

TABLE II.—COMPARATIVE STATEMENT: TEN YEARS, 1914–23.

Year.	Stud and Flock Rams.	Stud Breeding-ewes.	Stud Dry Ewes.	Stud Lambs.	Total Stud Sheep and Flock Rams.	Sheep of Distinctive Breed not entered in Flock-book, and Crossbred Sheep.				Grand Total, Stud and other Sheep.
						Wethers.	Breeding-ewes.	Dry Ewes.	Lambs.	
1914	321,869	229,055	13,526	170,169	734,619	3,211,661	12,691,121	1,152,749	7,008,613	24,798,763
1915	315,251	237,717	17,341	176,556	746,865	3,270,221	12,377,624	1,365,119	7,141,592	24,901,421
1916	310,131	252,201	15,012	175,155	758,499	3,478,263	12,640,566	1,189,023	6,721,799	24,788,150
1917	329,230	160,212	6,212	114,778	610,432	3,457,824	13,099,957	1,066,435	7,035,738	25,270,386
1918	325,111	171,437	6,297	125,116	627,961	3,696,520	12,850,597	1,592,452	7,770,772	26,538,302
1919	321,304	165,676	12,196	127,150	626,326	3,922,632	12,176,224	1,799,201	7,304,171	25,828,554
1920	306,621	154,516	9,803	109,454	580,394	3,901,712	11,415,159	1,814,391	6,208,284	23,919,970
1921	322,144	158,608	9,513	110,428	600,693	3,634,799	11,989,180	1,336,306	5,724,053	23,285,031
1922	322,072	154,277	7,259	98,221	581,829	2,727,624	12,341,777	952,789	5,618,240	22,222,259
1923	330,055	172,843	9,013	119,749	631,660	2,551,627	12,890,160	808,919	6,199,073	23,081,439

NOTE.—Stud sheep returned since 1917 are only those entered in Flock-books.

TABLE III.—DISTRIBUTION OF THE VARIOUS BREEDS AND OF CROSSBREDS IN EACH SHEEP DISTRICT (1923).

Breed.	Auckland.	Napier-Gisborne.	Wellington-West Coast.	Total in North Island.	Marlborough-Nelson-Westland.	Canterbury-Kaikoura.	Otago.	Total in South Island.	Total in Dominion.
Stud sheep (entered in Flock-book)—									
Merino	..	..	..	..	8,900	16,983	3,333	29,216	29,216
Lincoln	1,072	3,428	12,780	17,280	499	491	1,034	2,024	19,304
Romney	11,304	10,357	73,550	95,211	6,698	6,122	26,756	39,576	134,787
Border Leicester	588	..	754	1,342	260	9,859	12,326	22,445	23,787
English Leicester	454	665	383	1,502	1,201	19,907	763	21,871	23,373
Shropshire	248	35	102	385	183	2,300	391	2,874	3,259
Southdown	730	3,930	15,409	20,069	122	7,693	153	7,968	28,037
Corriedale	22	..	1,260	1,282	491	30,249	5,293	36,033	37,315
Other breeds	68	..	395	463	1,326	10,085	1,515	12,926	13,389
Totals	14,486	18,415	104,633	137,534	19,680	103,689	51,564	174,933	312,467
Sheep of a distinctive breed but not entered in Flock-book—									
Merino	11,980	15,163	31,377	58,520	182,160	408,843	282,376	873,379	931,899
Lincoln	10,421	64,154	42,857	117,432	5,011	5,318	14,374	24,703	142,135
Romney	240,279	1,163,610	1,012,363	2,416,252	156,482	79,676	312,829	548,987	2,965,239
Border Leicester	3,368	2,137	5,290	10,795	777	53,747	59,908	114,432	125,227
English Leicester	2,298	1,179	9,371	12,848	7,431	71,059	5,846	84,336	97,184
Shropshire	3,074	433	680	4,187	1,256	4,851	909	7,016	11,203
Southdown	1,980	13,541	26,659	42,180	206	5,850	17,113	23,169	65,349
Corriedale	386	243	33,545	34,174	13,642	357,294	254,728	625,664	659,838
Half-breds	2,383	181	1,284	3,848	196,281	832,112	282,062	1,310,455	1,314,303
Other breeds	1,532	781	961	3,274	2,077	32,377	3,051	37,505	40,779
Totals	277,701	1,261,422	1,164,387	2,703,510	565,323	1,851,127	1,233,196	3,649,646	6,353,156
Crossbreds and others not otherwise enumerated	1,445,670	4,742,496	3,780,453	9,968,619	681,530	2,696,842	3,068,825	6,447,197	16,415,816
Grand totals ..	1,737,857	6,022,333	5,049,473	12,809,663	1,266,533	4,651,658	4,353,585	10,271,776	23,081,439

CONTROL OF SHEEP-SCAB IN BRITAIN.

At the 22nd International Conference of Sheep-breeders, held at Newcastle-on-Tyne in July last under the auspices of the National Sheep-breeders' Association, the matter of sheep-scab in Britain was brought forward by the New Zealand delegates. The following resolution was carried: "That this international conference of sheep-breeders, at which delegates are present from Great Britain, Australia, Canada, South Africa, France, South America, Norway, Mexico, and New Zealand, wishes to call the attention of the Minister of Agriculture to the presence of sheep-scab in this country, and asks the Ministry to formulate means to ensure its eradication."

Subsequently the High Commissioner for New Zealand communicated with the (British) Minister of Agriculture asking his sympathetic consideration for the resolution, and expressing the view that the absence of scab in the flocks of Great Britain would be of benefit by facilitating export and giving purchasers a wider choice of flocks from which to select their stud animals.

A reply received from the Minister of Agriculture by the High Commissioner states that the question of the measures to be adopted with a view to the eradication of sheep-scab have for many years past received the close attention of the Ministry. In 1920 the whole policy of the Ministry in this connection was carefully reviewed. Until that date the measures taken had been based upon the recommendations of a Departmental Committee which reported in 1904. The principle of universal dipping of all sheep in the country in approved sheep-dips was at the time regarded as an aim the attainment of which would be relied upon in course of time to secure the complete eradication of sheep-scab. In pursuance of this aim the compulsory general dipping of all sheep throughout Great Britain, involving a single dipping annually, or, in the case of Scotland and the north of England, two annual dippings at long intervals, was in force continuously from the year 1908 to 1919 inclusive. Sheep-scab was not, however, eradicated. In the meantime, from 1908 to 1912, experimental investigations were carried out at the Ministry's laboratory, which led to the conclusion that a single dipping cannot be relied upon to eradicate the disease from a flock, and that compulsory dipping should mean at least two dippings, separated by a maximum interval of fourteen days between the dippings. This latter principle was adopted by the Ministry in the new policy inaugurated in 1920, when two Orders, entitled the "Sheep-scab Order of 1920" and the "Sheep (Double Dipping) Order of 1920," were issued. The first of these Orders governs the procedure adopted in individual outbreaks of sheep-scab, and the second is applied to areas in which sheep-scab is prevalent, or in which there is reason to believe that the disease may exist unreported. Double dipping, with an interval of not less than fourteen days between the dippings, imposed as a compulsory requirement, is the main principle upon which these two Orders are based. Recently the matter has again been under the consideration of the Ministry, with the result that a new Order entitled the "Sheep-scab Order of 1923" has been issued, directly throwing upon sheepowners the onus of curing and preventing scab in their sheep. A pamphlet has also been issued widely throughout the country by the Ministry advising owners as to the measures which they should adopt. The Minister expresses his hope that the new requirement may achieve some considerable measure of success in bringing about the ultimate eradication of scab.

HONEY-GRADING STORE AT GREYMOUTH.

The increased production of honey on the west coast of the South Island during recent years has necessitated the establishment of a honey-grading store for that district. The store known as Molan's Store, situated in Thompson Street, Greymouth, has been appointed for this purpose in accordance with the regulations relating to the export of honey from New Zealand.

PRESENTATION OF STUD PIGS.

MESSRS. Spicers Limited, London, recently presented to the New Zealand Government a boar and sow each of the Large Black and Large White breeds, the animals being unrelated in each case. These pigs are bred from Royal Show prizewinners. Cabling on 8th October, the High Commissioner stated that it was hoped to ship the animals by the "Port Victor" about the 19th, together with an additional purchased sow of each breed, which had been mated to males unrelated to either of the gift boars.

ELECTRIC POWER IN THE DAIRY INDUSTRY.

IN his annual report for 1922–23 the Chief Electrical Engineer, Public Works Department (Mr. Lawrence Birks), states under the heading of "Industrial Developments":—

"Electric milking plants, which will necessarily form a large proportion of the country load of the Electric-power Boards, have increased by over 100 per cent. during the year. There are now over 1,100 such plants in operation in the Dominion, as compared with 548 last year. The following indicates the distribution of these plants: Thames Valley Power Board, 384; Central Power Board, 247; Te Awamutu Power Board, 152; Cambridge Power Board, 100; Banks Peninsula Power Board, 67; Springs-Ellesmere Power Board, 28; Southland Power Board, 29; Tai Tapu Dairy Company, 36; Hawera Electric Supply Company, 50; other installations, 50: total, 1,143.

"The total number of milking-machines in the Dominion, operated for the greater part by benzine-engines, is 12,468, and is increasing at a rate of over 2,000 per year. There is thus ample scope for the development of electric-power supply in this direction.

"In addition to the milking plants, the dairy factories are proving a useful load, particularly the large butter and dried-milk factories, of which six are now supplied from Horahora."

AUSTRALIAN EMBARGO ON NEW ZEALAND POTATOES.

FURTHER official representations were made recently to the Commonwealth Government with the object of obtaining removal of the prohibition of the importation of potatoes from New Zealand into Australia. Stress was laid on the comparative harmlessness of powdery scab in this Dominion, and willingness to institute a strict inspection of potato shipments at this end was reiterated. A reply has been received from the Commonwealth Government stating that the matter had received careful consideration, but that in view of the information available regarding the incidence and spread of powdery scab in other countries it had been decided that the Government would not be justified in incurring the risk of introducing this potato-disease into Australia.

Weraroa Sale of Pedigree Cattle and Pigs.—The annual stud-stock sale of the Central Development Farm was held on 4th October, with a good attendance of buyers from various parts of the Dominion. In Friesian cattle the herd sire Dominion Woodcrest Piebe Mercedes, which is being superseded by a newly imported animal, was sold at 196 guineas to Dr. S. S. Cameron, of Melbourne. Among the yearling bulls Dominion King Woodcrest went to a Canterbury buyer at 85 guineas, and Dominion Paul Crest was bought for Taranaki at 80 guineas; the average of all Friesian yearlings was 42 guineas. In Red Polls the herd sire Force Majeure went to a Wairarapa buyer for 80 guineas, and the herd sire Aviator was bought for the Waikato at 50 guineas; the two-year-old bull Dominion Sylvan was sold for Southland at 60 guineas; and the yearling sales averaged 34 guineas. Among the Berkshire pigs, weaner boars made from 5 to 16 guineas, weaner sows from 5 to 7 guineas, and sows with litters up to 16 guineas.

INCREASE IN MERINO SHEEP.

FOR the second year in succession the Annual Sheep Returns (30th April) show an increase in the number of Merino sheep in the Dominion. This year stud Merinos total 29,216, as against 23,612 in 1922; and flock sheep 931,899, compared with 842,293 last year. Included in these totals stud breeding-ewes have increased from 13,550 to 15,886, and other breeding-ewes from 344,663 to 375,287.

THE STUART WILSON CUP AWARD.

THE Stuart Wilson Cup, which is competed for each year by the competitors in the boys' and girls' agricultural clubs conducted in co-operation with the Department of Agriculture, has this year been awarded to L. Stevenson, of Hampden School, Hampden, Otago. This competitor grew last season a crop of Arran Chief potatoes yielding at the rate of 22½ tons per acre. This yield was secured at a cost of £1 per ton. As the average yield of potatoes for the district is not more than 7 tons per acre, his performance is very meritorious, and indicates the value of thorough cultivation in increasing crop-yields. The runner-up for the cup was Harry Betts, of Okaiawa, Taranaki, who grew a crop of mangolds yielding 132 tons per acre, at a cost of 2s. 5d. per ton. A photograph of this crop was reproduced in the August *Journal*. A fair average yield of mangolds in the Taranaki District is somewhere in the vicinity of 50 tons per acre.

FORTHCOMING AGRICULTURAL SHOWS.

Poverty Bay A. and P. Association: Gisborne, 23rd and 24th October.
Marlborough A. and P. Association: Blenheim, 24th and 25th October.
Timaru A. and P. Association: Timaru, 24th and 25th October.
Wairarapa P. and A. Society: Carterton, 24th and 25th October.
Manawatu A. and P. Assn.: Palmerston North, 30th and 31st Oct. and 1st Nov.
Ashburton A. and P. Association: Ashburton, 31st October and 1st November.
Wanganui A. and P. Association: Wanganui, 7th and 8th November.
Canterbury A. and P. Association: Christchurch, 8th and 9th November.
Winton A. and P. Association: Winton, 14th November.
Egmont A. and P. Association: Hawera, 14th and 15th November.
Nelson A. and P. Association: Nelson, 20th November.
Waikato A. and P. Association: Hamilton, 20th and 21st November.
North Otago A. and P. Association: Oamaru, 21st and 22nd November.
Stratford A. and P. Association: Stratford, 21st and 22nd November.
South Otago A. and P. Association: Balclutha, 22nd and 23rd November.
Otago A. and P. Society: Dunedin, 28th and 29th November.
Southland A. and P. Association: Invercargill, 11th and 12th December.
Masterton A. and P. Association: Solway, 19th and 20th December.
Woodville A. and P. Association: Woodville, 22nd and 23rd January.
Feilding I., A., and P. Association: Feilding, 5th and 6th February.
Clevedon A. and P. Association: Clevedon, 9th February.
Dannevirke A. and P. Association: Dannevirke, 13th and 14th February.
Katikati A. and P. Society: Katikati, 21st February.
Rotorua A. and P. Association: Rotorua, 27th February.
Omaha and Pakiri A. and H. Society: Leigh, 1st March.
Taranaki Metropolitan Agricultural Society: New Plymouth, 5th and 6th March.
Waikato Central Agricultural Association: Cambridge, 5th and 6th March.
Morrinsville A., P., and H. Society: Morrinsville, 12th March.
Methven A. and P. Association: Methven, 27th March.
Temuka and Geraldine A. and P. Association: Winchester, 3rd April.

(Agricultural and Pastoral Association secretaries are invited to supply dates and location of their shows.)